US ARMY COMMUNICATIONS-ELECTRONICS COMMAND

# C3 SYSTEMS TECHNOLOGY SYMPOSIUM

8 OCTOBER 1991

COMBAT POWER FOR LEADERS

ADVANCE PLANNING BRIEFINGS FOR INDUSTRY

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US ARMY COMMUNICATIONS-ELECTRONICS COMMAND

C3 SYSTEMS TECHNOLOGY SYMPOSIUM

8 OCTOBER 1991

ADVANCE PLANNING BRIEFINGS FOR INDUSTRY

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703-5000

REPLY TO
ATTENTION OF

Ladies and Gentlemen:

   On behalf of the Communications-Electronics Command (CECOM), we are pleased to present these proceedings of the October 8, 1991 C3 Systems Technology Symposium.

   The C3 Systems Technology Symposium is part of a series of symposiums which CECOM is presenting as part of the Advance Planning Briefings for Industry program. This program is designed to enhance the Government-Industry communications network by providing forums for discussions concerning potential contract opportunities.

   Government and industry must work together to achieve our common goal to concentrate today's limited resources in areas that will most benefit the soldier. Towards this end, in this publication we share with you information concerning both long-term technological advances as well as near-term contractual opportunities in the C3 arena.

   It is our hope that this symposium, and the entire Advance Planning Briefings for Industry program, will be beneficial to both Government and Industry in achieving our objective: quality support to the soldier in the field.

Joseph J. Pucilowski, Jr.
Director, CECOM Center for Command,
   Control and Communications Systems

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THE OVERALL CLASSIFICATION

OF THIS PUBLICATION IS

UNCLASSIFIED.

US ARMY COMMUNICATIONS-ELECTRONICS
COMMAND (CECOM)

CENTER FOR C3 SYSTEMS TECHNOLOGY SYMPOSIUM
APBI LEVEL 2

OCTOBER 8, 1991
ALBERT J. MYER CENTER AUDITORIUM
FORT MONMOUTH, NEW JERSEY

MEETING CHAIRMAN
MR. JOSEPH PUCILOWSKI
Director, C3 Systems

AGENDA

0730 – Registration & Coffee/Danish

0815 – Administrative Remarks
        Mr. Charles Grzenda
        Chief, Office of Research & Technology Applications
        Center for C3 Systems

      Welcome
        Mr. Joseph Pucilowski
        Symposium Chairman
        Director, Center for C3 Systems

0830 – Session I – Topics
      – Speakeasy Overview
          Mr. John J. Jeski
          Electronics Engineer, Tactical Radio

      – Antenna Subsystem of the Speakeasy Program
          Mr. Alexander Strugatsky
          Electronics Engineer, Tactical Radio

      – Vehicular Conformal Antenna
          Mr. Robert Hoverter
          Electronics Engineer, Tactical Radio

      – UHF ECCM Techniques
          Mr. Joseph Inserra
          Electronics Engineer, Local Area Comm

0930 - Session II - Topics
- Survivable Adaptive System Technology
CPT James D. Bass
Electronics Engineer, Local Area Comm

- Adaptive Network Planning & Management
for the Localized Network Environment
Mr. Charles J. Graff
Electronics Engineer, Tech Plans & Sys Eng

1015 - Question/Answer Period

1030 - Break

1100 - Session III - Topics
- Soldier's Computer
Mr. James Wright

- User Interface Technology
Mr. John E. Quigley
Electronics Engineer, Command & Control

- Lower Echelon Command and Control
Dr. Dirk Klose/Mr. John W. Strozyk
Electronics Engineer, Command & Control

- Tactical Multinet Gateway for the Localized
Network Environment
Mr. Michael Bereschinsky, Electronics Engineer,
Command & Control

1200 - Session IV - Topics
- Fiber Optic Technology
Mr. Louis A. Coryell, Electronics Engineer
Local Area Comm

1215 - Session V - Topics
-Information Security
Mr. Barry S. Salis
Electronics Engineer, Information Security

-Modeling and Simulation
Mr. John Siliato
Electronics Engineer, Wide Area Comm

1245 - Question/Answer Period

1300 - Closing Remarks

1400 - One-on-Ones

CONTENTS

CECOM CENTER FOR COMMAND, CONTROL AND COMMUNICATIONS (C3) SYSTEMS

CENTER FOR COMMAND, CONTROL AND COMMUNICATIONS SYSTEMS (C3)

MISSION

- PERFORM RESEARCH, DEVELOPMENT AND ENGINEERING ON ALL ASPECTS OF COMMUNICATIONS AND AUTOMATIC DATA PROCESSING (ADP) TECHNOLOGIES AND PROVIDE ENHANCED COMMUNICATIONS-ELECTRONICS SYSTEMS AND EQUIPMENT CAPABILITIES TO SATISFY THE ARMY TACTICAL NEEDS.

- PROVIDE C3 ENGINEERING EXPERTISE TO PROGRAM EXECUTIVE OFFICERS, PROGRAM MANAGERS, LABORATORIES, CECOM ORGANIZATIONS, DA AND DOD AGENCIES IN DEVELOPMENT, ACQUISITION AND FIELDING OF TACTICAL C3 SYSTEMS.

CECOM CENTER FOR C3 SYSTEMS

DIRECTOR

TECH PROG & SYS ENGR
- STANDARDIZATION OFFICE
- SYSTEMS ENGINEERING
- BUDGET/ACQUISITION
- OPERATIONS/TECH PLANS
- ADMINISTRATIVE

INFORMATION MANAGEMENT

INFORMATION SECURITY
- KEY MANAGEMENT
- COMPUTER SECURITY
- NETWORK SECURITY
- COMSEC DEVELOPMENT

LOCAL AREA COMM
- FIBER OPTICS
- LOCAL AREA NETWORK
- MICROWAVE RADIO

COMMAND & CONTROL
- LOWER ECHELON C2
- AI/EXPERT SYS DECISION
- OPTADS/SYS INTEGRATION
- DISTRIBUTED SYSTEMS
- AFATDS SOFTWARE
- ADVANCED CONCEPTS
- TECH ASSESS CTR

INFORMATION TRANSPORT

WIDE AREA COMM
- SYSTEM CONTROL
- CIRCUIT SWITCHING
- MSE SUPPORT
- MSCS SUPPORT

TACTICAL RADIO
- HF COMM
- VHF COMM
- PM ADDS SUPPORT

ELEC MAG ENVIRONMENTS
- FREQUENCY ENGINEERING
- MODELING & SIMULATION

3

SPEAKEASY OVERVIEW

(MULTIMODE-MULTIBAND DIGITAL RADIO)

(UNCLASSIFIED)

JOHN J. JESKI
ELECTRONICS ENGINEER

CECOM CENTER FOR C3 SYSTEMS

POINT PAPER

SUBJECT: Multimode/Multiband Digital Radio

PURPOSE: Multi-phased effort at developing a software reprogrammable radio system. The Speakeasy program is phase one of this multi-phased effort.

FACTS:

· The Multimode/Multiband Digital Radio is a program intended to develop a new radio architecture. The new radio will consist of modules which may be combined onto a common bus in order to share information and processing capability. The design will be such that additional processing power will be possible through the addition of additional modules, or by replacing existing modules with newer more powerful ones. This is the basic concept of the open architecture which this program hopes to take advantage of and develop.

· The open architecture, combined with software reprogrammability and control will result in a radio system which can be altered by simply modifying software while maintaining the existing hardware.

· When completed, it is envisioned that the Multimode/Multiband radio will consist of a common bus which acts as an information and control path to a number of modules. These modules will be of the same design and act as 'processing engines.' If additional processing power is needed additional (common) modules will be added to the existing bus. All platforms will share the common modules and software controlling those modules. Logistic costs will be reduced because of the limited type of modules needed and technology can concentrate on the limited type of modules to make them more reliable and better performers.

· As the program progresses, and we actually develop hardware, we may learn that it is not an optimal size/cost/processing solution for all the modules to be exactly the same or to have one common bus. However, the basic intent of the program will remain - develop a radio which can be easily modified by changing its software, and whose processing power can be enhanced by the addition of processing modules.

BRIEFER: John J. Jeski, Electronics Engineer, AMSEL-RD-C3-TR-H, DSN 992-0444.

RELEASED BY:
ROBERT E. WHITMAN
Acting Director, C2C3S
X44449

ACTION OFFICER:
JOHN J. JESKI
Acting Chief, HF Communication Branch
CECOM Center for C3 Systems

MULTIMODE-MULTIBAND DIGITAL RADIO
HISTORY

DIGITAL HF TRANSCEIVER PROGRAM

- AWARDED TO GOULD NAVCOM 1985
- DEVELOP 100% DIGITAL HF RADIO
- 100% DIGITAL RADIO DELIVERED 1987
- SOFTWARE RECONFIGURABLE

MULTIMODE-MULTIBAND DIGITAL RADIO PROGRAM

- TACTICAL ANTI-JAM PROGRAMMABLE SIGNAL PROCESSOR

- MULTIMODE-MULTIBAND DIGITAL RADIO

- CURRENT PROGRAM RENAMED: "SPEAKEASY"

- SPLINTER PROGRAMS TO DEVELOP ANTENNA SYSTEM
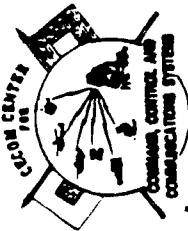
MULTIMODE–MULTIBAND DIGITAL RADIO

MODULE FUNCTION DEPENDS
ON SOFTWARE LOADED

WAVEFORM LIBRARY

MODULE
LOADED
TO EMULATE
SINCGARS
WAVEFORM

JTIDS
WAVEFORM

MIL STD 188-141

STAJ

COMMON
MODULE BEING
LOADED WITH
SINCGARS SOFTWARE

10011001111

JTIDS

STAJ

MIL STD-188-141

SINCGARS
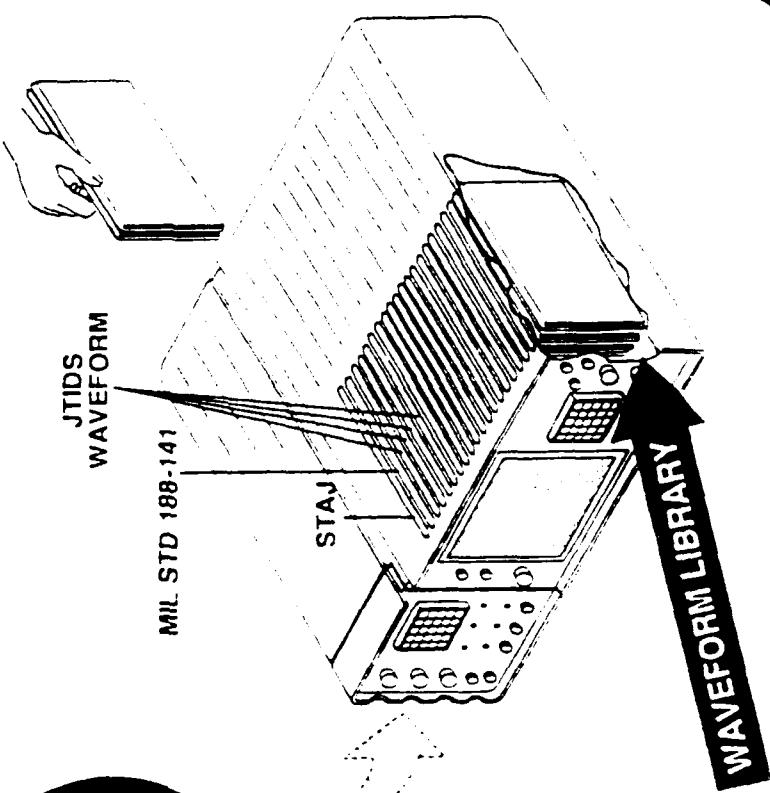
WITHOUT
PROGRAMMING

COMMON
MODULE
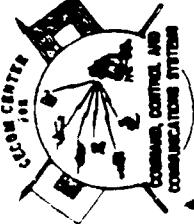
MULTIMODE–MULTIBAND DIGITAL RADIO

MODULAR APPROACH TO INCREASED CAPABILITIES
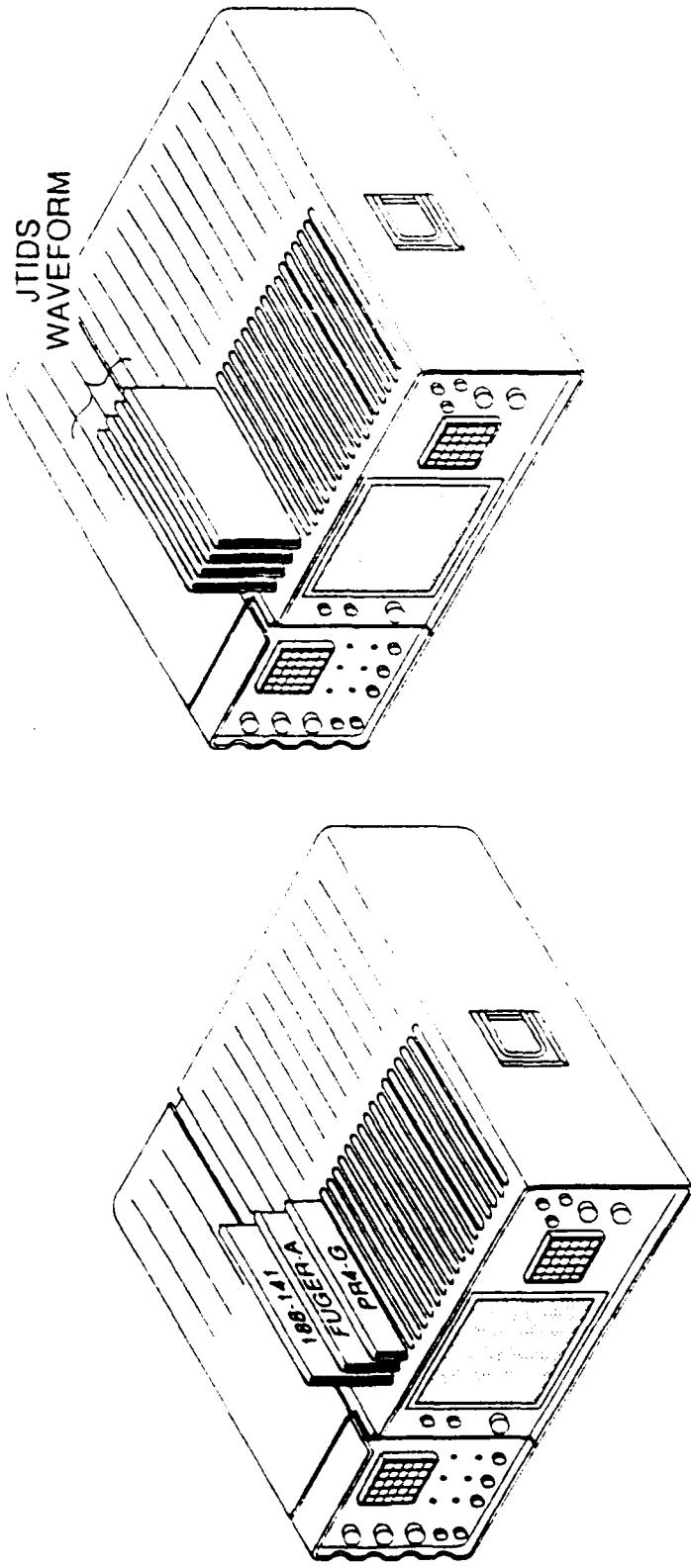
JTIDS WAVEFORM

186-141
FUGER-A
PR4-G

APPLICATIONS

MANPACK/
HANDHELD

VEHICULAR

MULTIMODE-MULTIBAND
RADIO

PROGRAMMABLE

SHELTERIZED
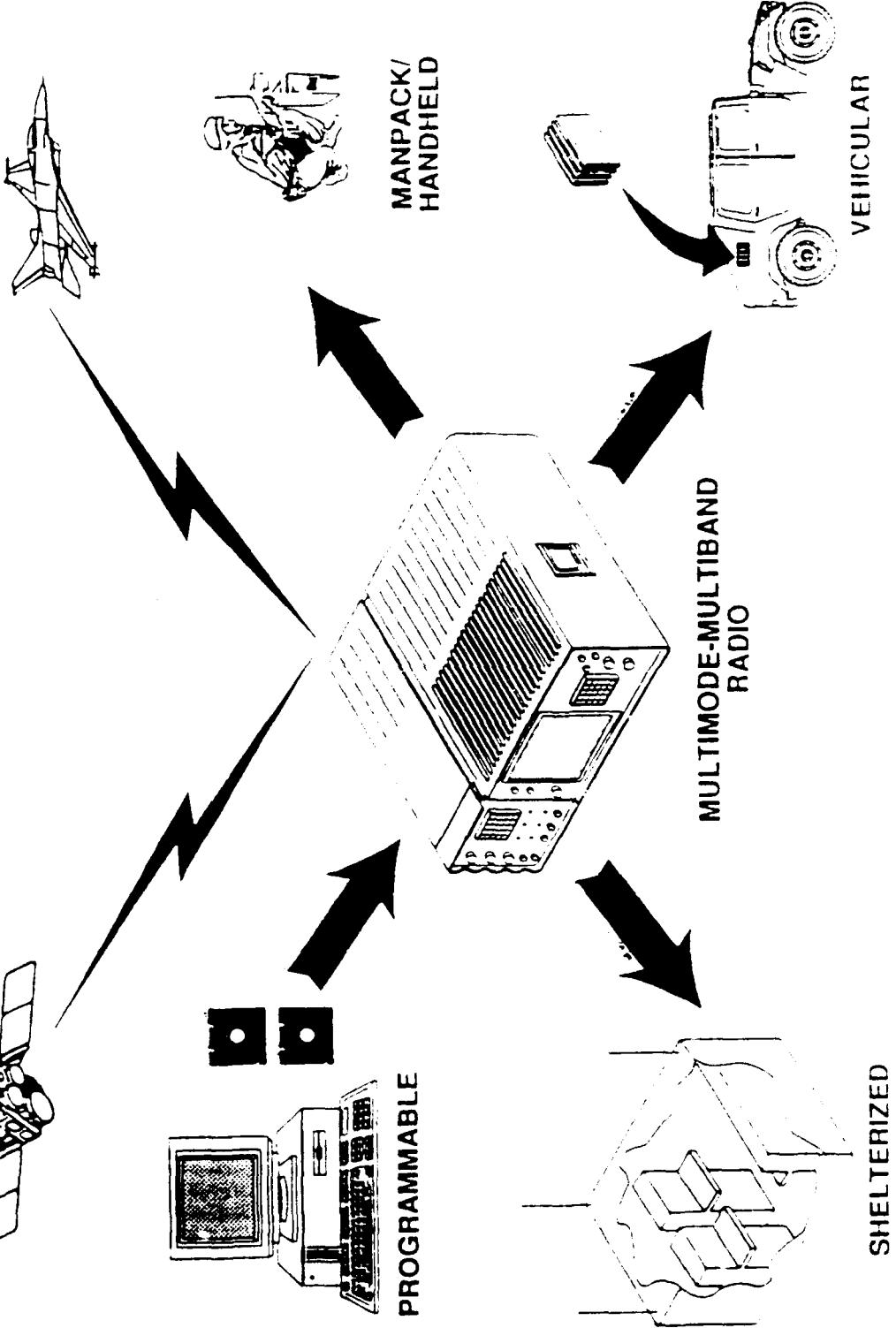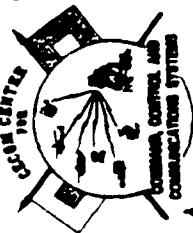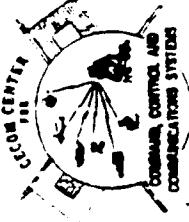
MULTIMODE-MULTIBAND DIGITAL RADIO

OLD
DESIGN OF RADIO

NEW
MULTIMODE MULTI BAND

MADE FOR SINGLE
FUNCTION

FUNCTIONS DEPEND
ON SOFTWARE

DIFFERENT COMPONENTS/
MODULES DEPENDING ON RADIO

ALL RADIOS SHARE
COMMON MODULES

NOT SENSITIVE TO
EVOLUTION OF USER

ADAPTS VIA SOFTWARE
INSTRUCTION TO SKILL OF USER

UNABLE TO ADAPT

FUNCTIONS CHANGED BY
MODIFYING SOFTWARE

CECOM CENTER
COMMAND, CONTROL AND
COMMUNICATIONS SYSTEMS
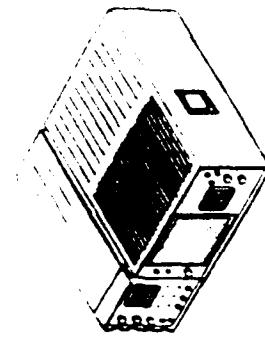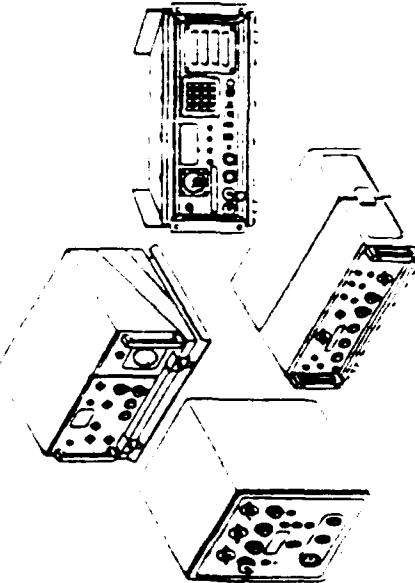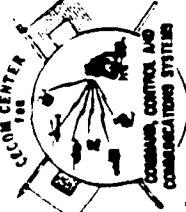
MULTIMODE–MULTIBAND DIGITAL RADIO

ARCHITECTURE

| OLD RADIO DESIGN	CURRENT CONCEPT	GOAL
ANTENNA	ALL BAND ANTENNA	ALL BAND ANTENNA
ANTENNA MATCHING	PIN DIODE SWITCH COUPLER	HIGH SPEED HIGH POWER A TO D D TO A
RX SMALL SIGNAL AMPLIFIER / TX POWER AMPLIFIER	RX SMALL SIGNAL AMPLIFIER / TX POWER AMPLIFIER	
ANALOG IF	IF A TO D D TO A	
ANALOG PROCESSING	DIGITAL SIGNAL PROCESSING	DIGITAL SIGNAL PROCESSING VOICE RECOGNITION
AUDIO/DATA INPUT/OUTPUT	AUDIO/DATA INPUT/OUTPUT	
1991	1997	2010

100% DIGITAL

CECOM CENTER 100

COMMAND, CONTROL AND COMMUNICATIONS SYSTEMS

MULTIMODE-MULTIBAND DIGITAL RADIO

ADVANTAGES

- MULTIPLE FUNCTIONS IN ONE RADIO

- MULTIPLE BANDS IN ONE RADIO

- EASY TO RECONFIGURE THROUGH SOFTWARE

- ADAPTABLE TO REQUIREMENTS

- ONE STANDARD TO DESIGN TO

- ONE BASIC RADIO AND COMMON HARDWARE

- BUILDING BLOCK APPROACH TO MORE
 CAPABILITIES/POWER
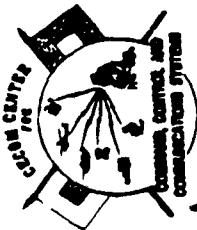
MULTIMODE-MULTIBAND DIGITAL RADIO

COMMONALITY

- GENERIC HIGH PROCESSING POWER SIGNAL PROCESSING MODULE

- ALL RADIOS SHARE SIMILAR MODULES

- THE MORE MODULES THE MORE CAPABILITIES

- REDUCED MAINTENANCE DUE TO ALL DIGITAL COMPONENTS

- REDUCED INVENTORY

- INCREASED SOPHISTICATION OF TEST EQUIPMENT DUE TO COMMON MODULE
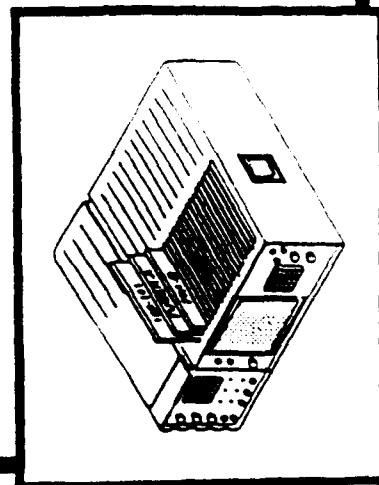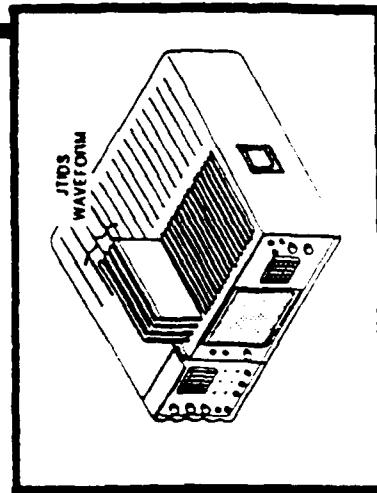
MULTIMODE–MULTIBAND DIGITAL RADIO WAVEFORMS

- MOBILE SUBSCRIBER RADIO TERMINAL (MSRT)

- SHORT TERM ANTI-JAM (STAJ) IAW MIL–STD–188–148

- SATURN–NATO VERSION OF HAVE QUICK IIA

- LPI

- PACER BOUNCE

- SINCGARS

- FUGER–A/VHF (GERMAN)

- AUTOMATIC LINK ESTABLISHMENT IAW MIL–STD–188–141A

- MODEM WAVEFORMS IAW MIL–STD–188–110 CN 2

- PR4–G (FRENCH)

- SATCOM (TSC–94A)

- TRC–170

- HAVE QUICK I, II, IIA

- JTIDS

- BOWMAN

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MULTIMODE-MULTIBAND DIGITAL RADIO
MAJOR THRUSTS

CONTINUE DEVELOPMENT OF MULTIMODE-MULTIBAND DIGITAL RADIO

- AMPLIFIER

- REDUCING SIZE OF PHASE I

- ANTENNA INTEGRATION

- NETWORK MANAGEMENT

- SYSTEM INTEGRATION

MULTIMODE-MULTIBAND DIGITAL RADIO
POSSIBLE USER REQUIREMENTS/DEFICIENCIES

- SMALLER

- MULTIPLE FUNCTION

- NETWORK MANAGEMENT

- RECONFIGURABILITY

- POWER SYSTEM

- IMBEDED COMSEC/TRANSEC

- RELIABILITY

MULTIMODE-MULTIBAND DIGITAL RADIO
CAPABILITIES

A NEW OPEN ARCHITECTURE RADIO SYSTEM
WHICH ALLOWS FOR NEW WAVEFORMS AND
THE EMULATION OF EXISTING WAVEFORMS
VIA SOFTWARE CHANGES

MULTIMODE-MULTIBAND DIGITAL RADIO
PROGRAM STRATEGY

- CURRENT STATUS:

  PERFORMING PHASE I TO DETERMINE
  INFORMATION FOR THE DEVELOPMENT
  OF THE PHASE II PROGRAM

- FUTURE PLANS:

  USING INFORMATION FROM PHASE I
  DEVELOP A PLAN TO CORRECT DEFICIENCIES
  AND PRODUCE A COMPLETE RADIO SYSTEM

MULTIMODE-MULTIBAND DIGITAL RADIO
CONTRACT OPPORTUNITY

- PHASE II

- STATUS: DEVELOP RF SECTION OF RADIO SYSTEM, (AF LEAD) COMPLETE ARCHITECTURE DESIGN

- TYPE: COMPETITIVE, CPFF

- SCHEDULE: 2 YEAR CONTRACT TO BE AWARDED IN OCTOBER 1994

- APPROXIMATE VALUE: $7M

- POC/PHONE#: JOHN JESKI, (908)544-0444

ANTENNA SUBSYSTEM

OF THE

SPEAKEASY PROGRAM

(UNCLASSIFIED)

ALEXANDER STRUGATSKY
ELECTRONICS ENGINEER

CECOM CENTER FOR C3 SYSTEMS

POINT PAPER

SUBJECT: Multimode/Multiband Digital Radio Antenna System

PURPOSE: Development and formal technology demonstration of a compact, extremely wideband antenna system

FACTS:

· In this joint development program, this Center will be conducting the development, prototype fabrication and demonstration of a new compact, extremely wideband antenna system.

· The major technical factors to be demonstrated by this program include:

- Extremely wide bandwidth: 2 MHz to 3 GHz.

- Capable of simultaneously supporting up to four frequency agile waveforms.

- Compact: Mounted on a small vehicle. Drastically reduced size and weight as compared with conventional antennas covering this frequency range.

- More survivable as compared with existing antennas due to its smaller profile.

· This program is one of our joint development efforts with Rome Laboratory. The primary objective is to allow both services to maximize commonality potential within constrained resources. CECOM will be the lead organization on this program and contract opportunities will originate from this location.

· The program will be structured into two phases, starting with an exploratory development effort and concluding with a prototype of a compact wideband antenna which will be demonstrated. Demonstration of the antenna system is expected in mid FY93.

· A follow-on phase will result in the development of an antenna in support of the Digital Radio program that could form the basis of the follow-on development programs to evolve the combat net radio of the Battlefield Information System of 2015.

BRIEFER: Alexander Strugatsky, AMSEL-RD-C3-TR-H, DSN 992-0466.

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X44449

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MULTIMODE-MULTIBAND DIGITAL RADIO ANTENNA SYSTEM
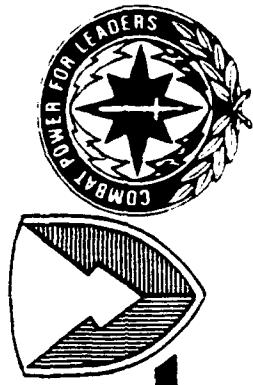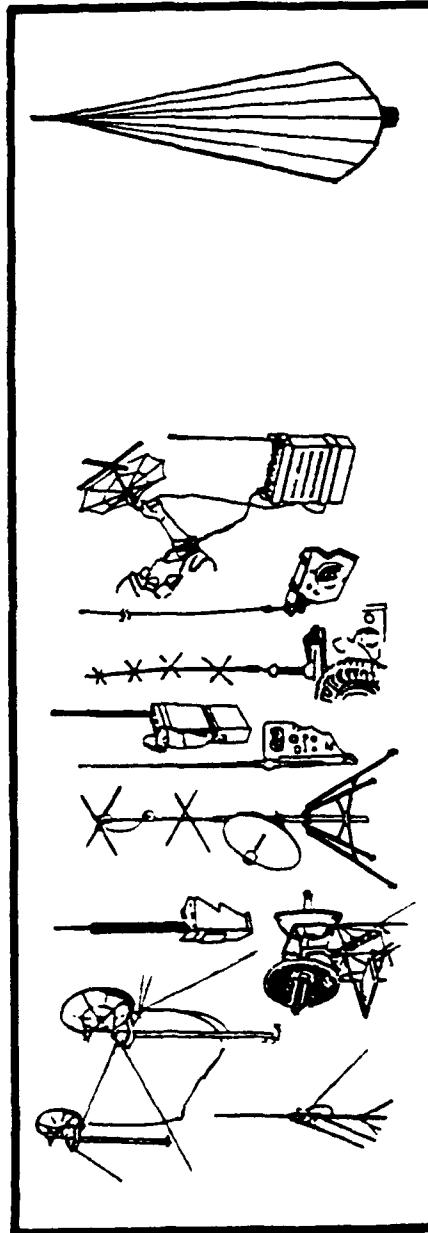
US ARMY COMMUNICATIONS-ELECTRONICS COMMAND

MULTIMODE-MULTIBAND DIGITAL RADIO

ANTENNA SYSTEM

MAJOR THRUSTS

- US ARMY CECOM LEAD

- BTI FUNDED FY91 ⟶ FY93

- ANTENNA, COUPLER AND RF POWER AMPLIFIER
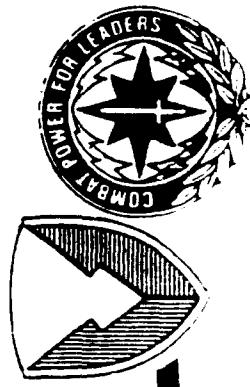
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MULTIMODE-MULTIBAND DIGITAL RADIO

ANTENNA SYSTEM

USER REQUIREMENTS/DEFICIENCIES

- MANY ANTENNA SYSTEMS ARE REQUIRED TO COVER THE DESIRED BANDWIDTH (2MHz-3GHz)

- EACH RADIO SYSTEM REQUIRES A UNIQUE ANTENNA

- COSITE INTERFERENCE

- MULTIPLE ANTENNAS ON A SINGLE PLATFORM

- MANPACK
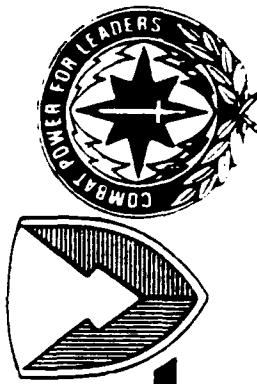
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MULTIMODE-MULTIBAND DIGITAL RADIO

ANTENNA SYSTEM

ADDITIONAL CONSIDERATIONS

■ ONE ANTENNA SYSTEM TO COVER THE ENTIRE 2MHz TO 3GHz BANDWIDTH

■ MINIMIZE INTERACTION BETWEEN BANDS

■ PLATFORM COMPATIBILITY

   ■ MANPACK   ■ TRACKED VEHICLE

   ■ WHEELED VEHICLE   ■ AIRCRAFT
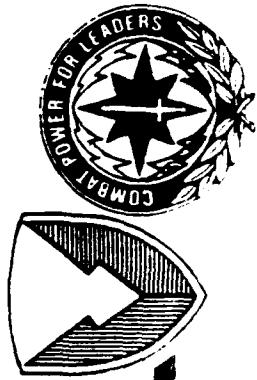
MULTIMODE-MULTIBAND DIGITAL RADIO

ANTENNA SYSTEM

PROGRAM STRATEGY

CURRENT STATUS:

PHASE ONE: FY-91 START

- PARALLEL STUDY CONTRACTS TO DEFINE THE STATE THE ART

  - ANTENNA TECHNOLOGY
  - MATERIAL RESEARCH
  - COMPUTER SIMULATION

- COORDINATE EFFORTS WITH USERS
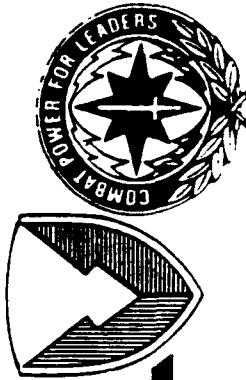
US ARMY COMMUNICATIONS-ELECTRONICS COMMAND

MULTIMODE-MULTIBAND DIGITAL RADIO

ANTENNA SYSTEM

PROGRAM STRATEGY

CURRENT STATUS (CONT):

PHASE TWO: FY92-93

- PROTOTYPE DEVELOPMENT
  THE STATE THE ART

- DEMO WITH SPEAKEASY PROCESSOR

- DEFINE FOLLOW-ON COUPLER/AMPLIFIER
  TECHNICAL REQUIREMENTS
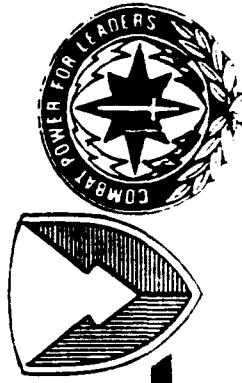
US ARMY COMMUNICATIONS-ELECTRONICS COMMAND

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MULTIMODE-MULTIBAND DIGITAL RADIO ANTENNA SYSTEM

CONTRACT OPPORTUNITY

- PHASE III

- STATUS: DESIGN AND INTEGRATE ANTENNA
  SUBSYSTEM INTO THE SPEAKEASY
  RADIO

- SCHEDULE: 2 YEAR CONTRACT TO BE AWARDED
  OCTOBER 1994

- APPROXIMATE VALUE: $3M (UNFUNDED)

- POC/PHONE#: ALEX STRUGATSKY, (908)544-0466

VEHICULAR CONFORMAL ANTENNAS

(UNCLASSIFIED)

ROBERT HOVERTER
ELECTRONICS ENGINEER

CECOM CENTER FOR C3 SYSTEMS

POINT PAPER

SUBJECT: VEHICULAR CONFORMAL ANTENNAS

OBJECTIVE: An exploratory development and feasibility demonstration effort to provide an assessment of tactical vehicles, radio systems (both high frequency (HF) and very high frequency (VHF)), and conformal antennas for use in the tactical environment. Conformal antennas are those which by their mechanical configuration are an integral part of the vehicle. As an example the antenna could be the handrail, as in the case of a tracked vehicle, or part of the fender or canopy support in the case of a wheeled vehicle. The technical assessment would identify candidate structures, candidate vehicles (i.e. HMMV, M1, M2), and candidate radio systems followed by a feasibility demonstration phase and evaluation of models on respective tactical vehicles.

FACTS: The state-of-the-art in conformal antenna technology can be pushed to assess the feasibility of replacing existing tactical vehicular antennas (HF and VHF) with a conformal antenna without a major reduction in communication range. The benefit realized from this is a lower profile antenna presenting less of a visible signature for identification of command post vehicles, as well as a safety margin from high voltage power lines. Reduction in thermal, optical, and visible profile, as well as radar cross section is a goal.

MILESTONES: FY92   Begin technical assessment.
　　　　　　 FY93   Complete technical assessment/initiate
　　　　　　　　　　　　feasibility contract.
　　　　　　 FY94   Complete feasibility models and conduct
　　　　　　　　　　　　evaluation tests on candidate vehicles.

BRIEFER: Robert T. Hoverter
　　　　　 Electronics Engineer
　　　　　 AMSEL-RD-C3-TR-V
　　　　　 (908) 532-0455

RELEASED BY:　　　　　　　　　　　　ACTION OFFICER:
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　　　　　　　　　　　　　　　　　　　(908) 532-0455

VEHICULAR CONFORMAL ANTENNAS
MAJOR THRUST

- Develop Antennas that by their their Mechanical Configuration are an Integral Part of Vehicle

- Reduce Visible Signature and High Profile of Existing Command Posts, Increase Safety, Reduce Thermal and Optical Profiles, and Reduce Radar Cross-Section

3.2

USER REQUIREMENTS/DEFICIENCIES

- LOW PROFILE ANTENNAS

- INCONSPICUOUS ANTENNAS

- SAFETY

KEY OPERATIONAL CAPABILITIES

- REDUCE VISIBLE SIGNATURE

- REDUCE MECHANICAL COMPLEXITY

- PROVIDE SAFETY ENHANCEMENT

- REDUCE THERMAL AND OPTICAL
  PROFILE

VEHICULAR CONFORMAL ANTENNAS
PROGRAM STRATEGY

FUTURE STRATEGY:

- Exploratory Development to Assess Vehicles and Radio Systems that may be Candidates for Conformal Antenna Technology

- Fabrication of Feasibility Models

- Demonstration/Tests of Models

FY93 OBJECTIVES:

- COMPLETE TECHNICAL ASSESSMENT AND IDENTIFY SPECIFIC CONFORMAL ANTENNAS TARGETED FOR EACH CANDIDATE VEHICLE

- INITIATE PROCUREMENT ACTION FOR FOLLOW-ON FEASIBILITY MODELS

FUTURE PLANS:

- COMPLETE FEASIBILITY MODELS AND CONDUCT DEMONSTRATION TESTS ON RESPECTIVE TACTICAL VEHICLES

VEHICULAR CONFORMAL ANTENNAS
CONTRACT OPPORTUNITY

- **OBJECTIVE:** Assess, Develop and Demonstrate Conformal Antenna Technology for Tactical Vehicular Use

- **TYPE:** Competitive, CPFF

- **STATUS:** 6.2 Development

- **SCHEDULE:** Award Date - 3QFY92
  Contract Length - 24 Months

- **APPROX. VALUE:** < $1 Million

- **POC/PHONE:** R. Hoverter/(908) 532-0455

UHF ECCM TECHNIQUES PROGRAM

(UNCLASSIFIED)

JOSEPH INSERRA
PROJECT ENGINEER

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-LA-M

POINT PAPER

OBJECTIVE: Development of ECCM enhancements for UHF LOS Transmission Systems operating in Corps and Division areas.

FACTS:

1. The deficiency which the UHF ECCM Techniques (UETS) Program addresses is that there are no active electronic counter-countermeasures (ECCM) incorporated into present UHF LOS Transmission Systems operating in Army Corps and Division areas to allow reliable operation in an electronic jamming environment.

2. The key operational capability which is to be provided by the UETS development is to allow survivable communications when operating during jamming. An added benefit of this development is that it will also provide enhanced system operation in a benign environment by increasing link margin and alleviating co-site interference.

3. Possible enhancements are an improved antenna system (i.e., adaptive antennas, larger passive arrays), error correction coding/decoding, and increased transmit power for the AN/GRC-226. The AN/GRC-226 is the UHF multichannel radio used in the Mobile Subscriber Equipment (MSE) system and operates in the 225-400 MHz (Band 1) and 1350-1850 MHz (Band 3) frequency bands; since the error correction coding will be accomplished at baseband one design will suffice for both frequency bands. A more complete description of these techniques follow:

(a) Error Correction Coding with Interleaving - Coding with interleaving will provide burst and random error correction capabilities to the MSE UHF LOS system and will be provided for two applications:

(1) Full Channel Coder (FCC): The FCC will be applied to the complete 16 channel digital transmission group used in the NCS-SEN and NCS-RAU links.

(2) Selected Channel Coding (SCC): The SCC will be applied to the routing (RSS) channel and common channel signalling (CCS) channels of the 32 and 64 DTGs used in the NCS-LEN and NCS-NCS (backbone) links, respectively. It is presumed that this coding will be provided as a software enhancement to the TTC-46 and 47 switches.

(b)   Improved Antenna System (IAS): The Improved Antenna System (IAS) will provide performance enhancement either through replacement or modification of the present antenna systems being used in Band 1 and Band 3.   The two IAS approaches follow:

(1)   Active IAS. The active IAS will provide automatic nulling (cancellation) of unwanted signals while receiving the desired signal.

(2)   Passive IAS. The passive IAS will provide a reduction in the reception of unwanted signals through the use of a new antenna design with improved pattern characteristics.

(c)   Power Amplifier (PA). The PA will provide an increase in transmit power. It will require a duplexer to allow full duplex operation.

4.   Presently, the Army is formulating requirements for the ECCM enhancements. Once they have been determined, a market survey will be performed to determine what is available to meet these requirements. After this is determined, this information will be given to the GTE Government Systems Corp. (MSE Prime contractor) to determine the feasibility of integrating these enhancements into the MSE system with minimum impact. Finally, once this determination is made, CECOM will initiate an R&D program accordingly to build prototypes for test and demonstration.

The UETS Program may consist of 2 phases. Phase 1 is for the design, development, test, and demo of 3 prototypes of each enhancement to insure feasibility of fit, form, and function; Phase 2 will be a follow-on option to develop, build, and test 10 each engineering development models to military specifications for production proveout. The initiation of Phase 2 will depend on the successful demonstration of the protoypes developed in Phase 1 and availability of PM MSE funds. The briefing presentation relative to cost and schedule pertains to Phase 1 only.

BRIEFER: Joseph Inserra, AMSEL-RD-C3-LA-M, (908) 544-4107.

PROGRAM THRUST

- USER REQUIREMENTS/DEFICIENCIES

    - PRESENT UHF LOS MULTICHANNEL TRANSMISSION SYSTEMS DO NOT HAVE AN ECCM CAPABILITY TO COUNTER ELECTRONIC JAMMING

- KEY OPERATIONAL CAPABILITIES

    - PROVIDE ECCM ENHANCEMENTS TO ALLOW SURVIVABLE COMMUNICATIONS WHEN OPERATING DURING JAMMING

ADDITIONAL CAPABILITIES

- ENHANCE SYSTEM OPERATION IN A BENIGN ENVIRONMENT

  - INCREASE LINK MARGIN
  - ALLEVIATE CO-SITE INTERFERERENCE

PROGRAM STRATEGY

- REQUIREMENTS FOR ECCM ENHANCEMENTS BEING FORMULATED

- DETERMINE FEASIBILITY OF INTEGRATING INTO MSE WITH MINIMUM IMPACT

- INITIATE R&D PROGRAM TO BUILD PROTOTYPES FOR TEST AND DEMONSTRATION

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UHF ECCM TECHNIQUES PROGRAM

FY 92 OBJECTIVES:

- IDENTIFY REQUIRED ECCM ENHANCEMENTS
- DETERMINE FEASIBILITY OF INTEGRATING
  INTO MSE

FUTURE PLANS

FY 93 - INITIATE R&D PROGRAM TO
BUILD PROTOTYPES

FY 94 - TEST AND DEMO OF PROTOTYPES
IN THE MSE SYSTEM

CONTRACT OPPORTUNITY
UHF ECCM TECHNIQUES

OBJECTIVE: DEVELOP AND FABRICATE 6.3 B
PROTOTYPES OF ECCM ENHANCEMENT
- INTEGRATE AND TEST IN MSE
- CONCLUDE WITH DEMO OF HARDWARE

TYPE: COMPETITIVE

STATUS: 6.3B DEVELOPMENT (PHASE I)

SCHEDULE: AWARD DATE - 2Q 93
CONTRACT LENGTH - 24 MONTHS

APPROXIMATE VALUE: $4M

POC/PHONE #: JOSEPH INSERRA/(908)544-4107

SURVIVABLE ADAPTIVE SYSTEM TECHNOLOGY ADVANCED TECHNOLOGY TRANSITION DEMONSTRATION (SAST-ATTD)

(UNCLASSIFIED)

CPT JAMES D. BASS
ELECTRONICS ENGINEER

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-LA-L

POINT PAPER

SUBJECT: Survivable Adaptable System Technology-Advanced
Technology Transfer Demonstration

OBJECTIVE:

   o An Adaptive Network for Multimedia Communications
      supporting Common Hardware Software (CHS) equipment

   o Integrated Systems Development in five technology thrust

      oo Fiber Distributed Data Interface (FDDI)
      oo Wireless LANS (EHF, Omni-Directional, and Long Hall)
      oo Tactical Network Management (includes System Software
          and Gateway Technology)
      oo Host Auto-Configuration
      oo Network Security

   o High technology contracts shifting to CPFF in FY93-95

FACTS:

   o We are developing a system to give the Tactical Computer
User:

   oo High capacity (100Mbps +)
   oo Multimedia (Data, Packet Voice and Video)
   oo Survivability (Wireless LANS, dual ring fiber, Command
and Control on the move)

   o OPPORTUNITY FOR CONTRACTORS:

   oo System Integration

BRIEFER: CPT JAMES D. BASS, AMSEL-RD-C3-LA-L, (908)544-3697
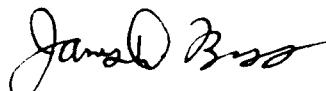
JAMES D. BASS
CAPTAIN, U.S. ARMY
SYSTEMS ENGINEER
(908) 544-3697

MAJOR THRUSTS
SAST-ATTD

- WIRELESS LAN

- AUTOMATIC NETWORK MANAGEMENT AND GATEWAYS

- HOST AUTO-CONFIGURATION

- NETWORK SECURITY

- FIBER DISTRIBUTED DATA INTERFACE (FDDI)

SAST ATTD PROGRAM

Baseline ATCCS

- MCS v. 10/11
- CHS 1

+

Fiber Distributed Data Interface (FDDI), Multimedia and High Speed Communications

Wireless LAN Using EHF Technology

Network Management and Gateways for the Tactical Environment

Auto-configuration and Dynamic Reconfiguration with Graceful Degradation

Network Security Supporting Multimedia and High Speed Local Area Communications

→

Integrated Local Area Communications System

to Support

Command & Control

for the

ATCCS Objective System

WIRELESS NETWORKS

- USE OF 54 GHz MAY PROVIDE REQUIRED LPI/AJ

- WIRELESS LAN WILL ALLOW RAPID NETWORK CONFIGURATION AND MODERATE SPEED (10 Mbps) OPERATION UNTIL FDDI IS OPERATIONAL

- OPERATION WHEN FIBER IS NOT PRACTICAL DUE TO TERRAIN OR TACTICAL SITUATION

NETWORK MANAGEMENT & GATEWAYS

- NETWORK MANAGEMENT & GATEWAY PROTOCOLS COMPATIBLE WITH ATCCS CHS

- MULTIMEDIA GATEWAY & NETWORK MANAGEMENT FOR ALL COMPONENTS OF LOCAL AREA COMMUNICATION SYSTEM

- PROVIDE COMPUTER BASED TOOLS TO DIAGNOSE & RESOLVE NETWORK PROBLEMS

- ABILITY TO ROUTE DATA AROUND NODES WHICH ARE DESTROYED

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NETWORK MANAGEMENT AND GATEWAYS

- SELECTS THE MOST EFFICIENT ROUTE
- AVOIDS TRAFFIC JAMS
- NETWORK MANAGEMENT SOFTWARE HELPS GATEWAY LOCATE AND AVOID LOST COMMO SYSTEMS
- FILTERS OFF-LAN TRAFFIC
- PACKETIZED VOICE, DATA AND VIDEO

LAN

ETHERNET

FDDI

WIRELESS

CNR

MSE VOICE

MSE DATA

TACSAT

WAN

MULTIMEDIA GATEWAY

DNVT   DATA FILES   PACKET VIDEO   TELEMETRY AND FAX

USER SERVICES

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TC3JV515
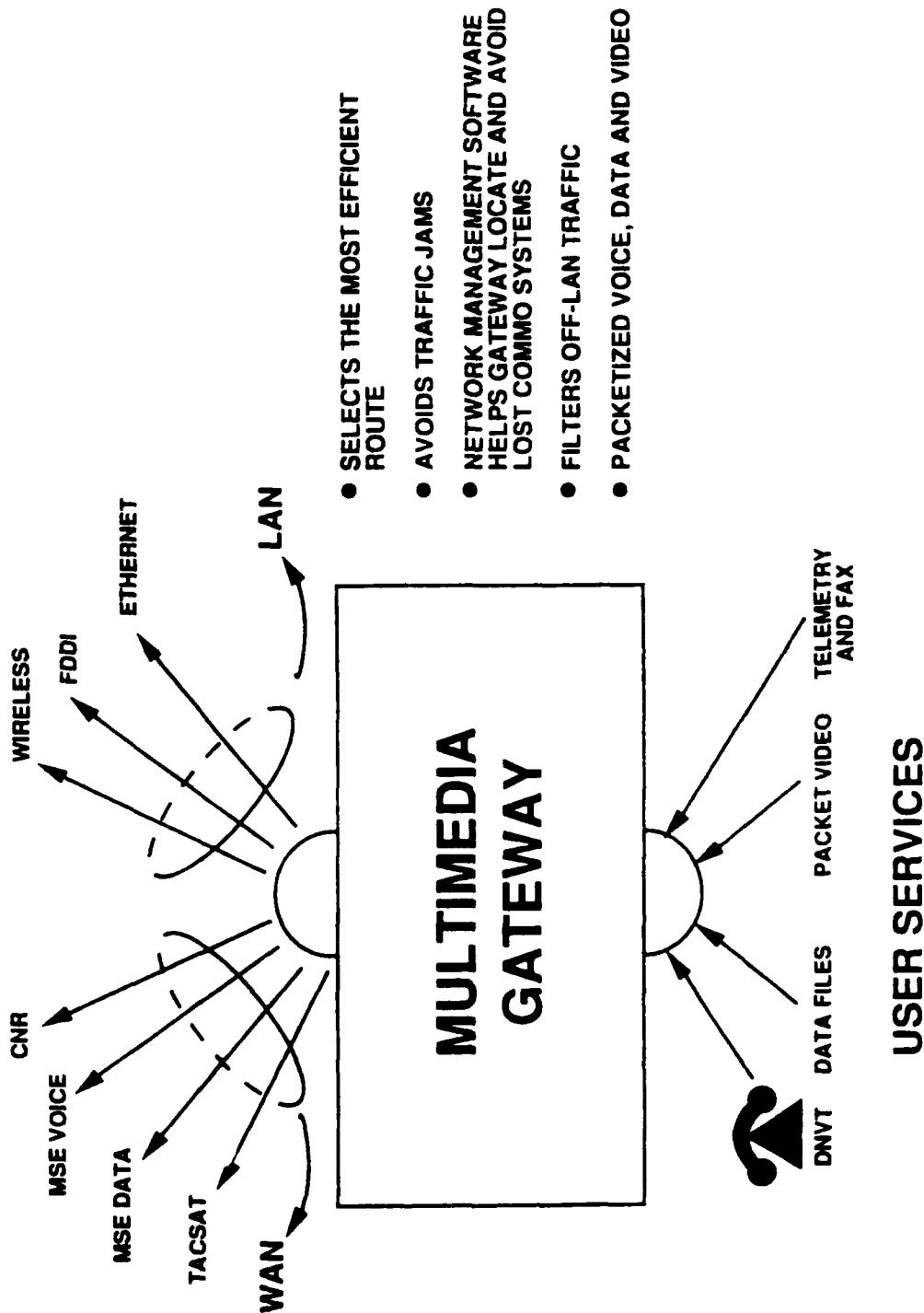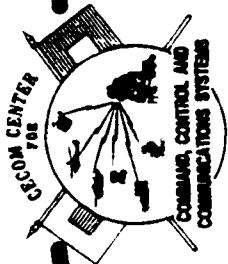
AUTO-CONFIGURATION

- ABILITY TO CONFIGURE NEW USERS DYNAMICALLY IN A BATTLEFIELD ENVIRONMENT

- ABILITY TO GRACEFULLY DEGRADE THE NETWORK WHEN SYSTEMS MOVE OR ARE DESTROYED

- ABILITY TO PROVIDE CONFIGURATION INFORMATION IN A SECURE "NEED-TO-KNOW" FASHION

- ABILITY TO RUN MULTIPLE BFA PROGRAMS TO PROVIDE CROSS OPERATION IN THE EVENT OF EQUIPMENT LOSS/FAILURE

NETWORK SECURITY

- SECURE FIBER

- TACTICAL END-TO-END ENCRYPTION DEVICE (TEED)

- PROTOCOL "GATEWAYS" BETWEEN SECURITY SYSTEMS

FDDI

- COAXIAL ETHERNET AND 26 PAIR CABLE REPLACED BY TFOCA (DUAL RING TECHNOLOGY)

- FDDI DATA RATE IS 100 Mbps

- TFOCA ALLOWS WIDE DISPERSION OF COMMAND POST

- FDDI SUPPORTS VOICE, DATA, AND VIDEO PACKETS

USER REQUIREMENTS/DEFICIENCIES

- LIMITED CAPACITY

- LIMITED MOBILITY

- EXCESSIVE SET-UP/TEAR-DOWN TIME

- SEPARATE VOICE/DATA COMMUNICATIONS

- INADEQUATE DISPERSAL

- INABILITY TO ADAPT TO NODE
  FAILURE/LOSS

- SECURITY

- TIME-CONSUMING MANUAL RECONFIGURATION

- NO VIDEO CAPABILITY IN COMMAND POST

KEY OPERATIONAL CAPABILITIES

- SURVIVABILITY OF ATTCS BFAs

- WIRELESS HIGH CAPACITY COMMUNICATIONS

- INTEGRATION OF VOICE/DATA/VIDEO

- INTERFACE INTO WIDE AREA SYSTEM

- AUTOMATED RAPID RECONFIGURATION OF CP ASSETS
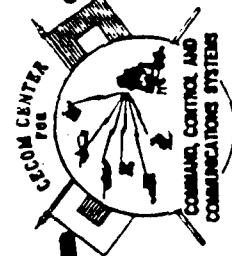
ATTD NEW TECHNOLOGY IMPACT
USER REQUIREMENTS/DEFICIENCIES

CECOM CENTER FOR COMMAND, CONTROL AND COMMUNICATIONS SYSTEMS

PRESENT CONFIGURATION

NEW CONFIGURATION

TACTICAL WIDE AREA NETWORK (MSE)

SMART GATEWAY

200 KM MAX LOOP

FDDI

WIRELESS

(E) = ETHERNET   WS = WORKSTATION   ☎ = VOICE   □ = VIDEO   FDDI = FIBER (OPTIC) DIGITAL DATA INTERFACE

TC3JV520
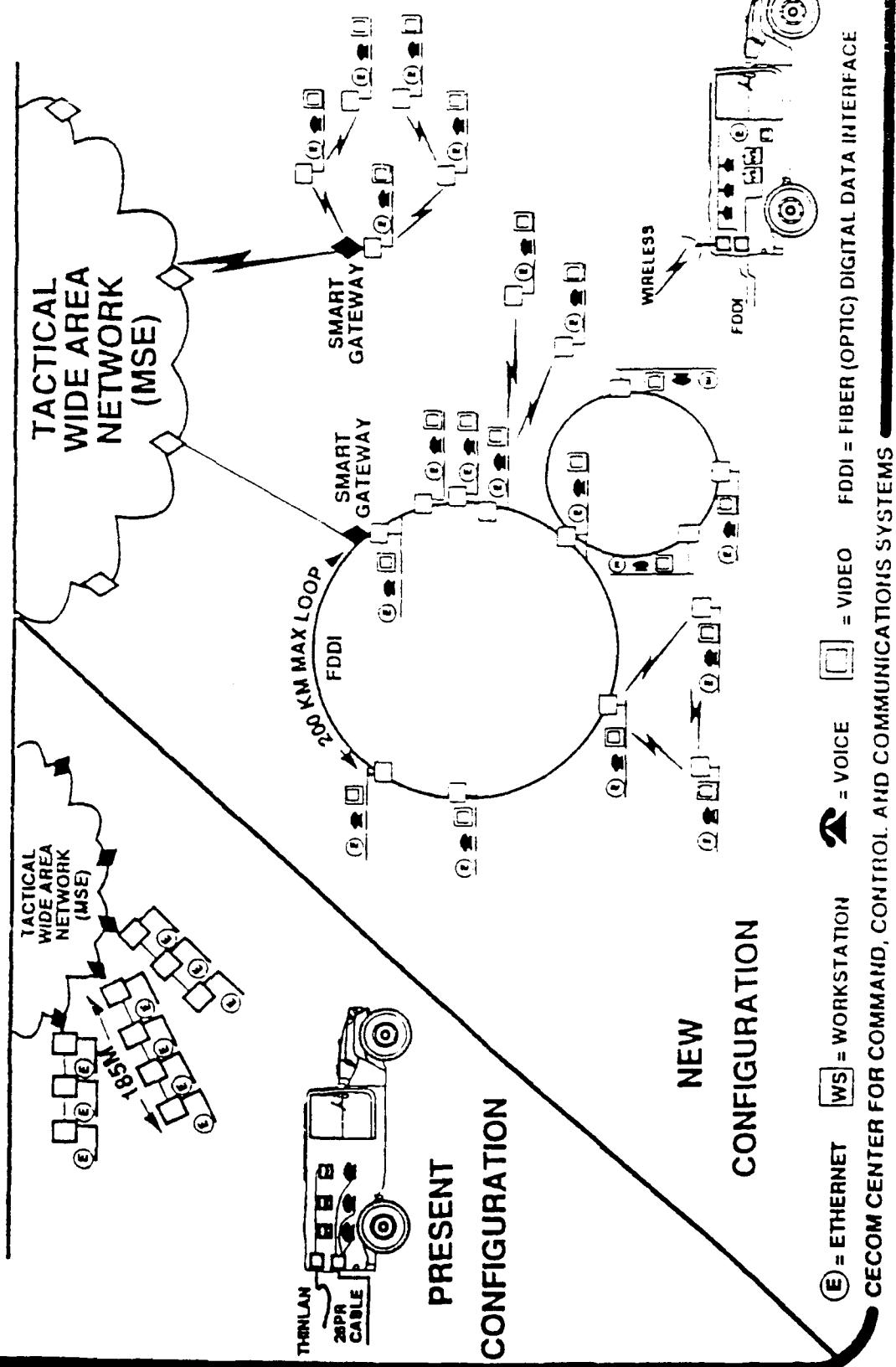
PROGRAM STRATEGY

- INTEGRATE 6.2 TECHNOLOGY BASE

- LEVERAGE COMMERCIAL DEVELOPMENTS

- DEMONSTRATE TECHNOLOGY THRUST TO USER TO SHOW PROOF OF PRINCIPLE

- TRANSITION TECHNOLOGIES TO PEO/PM

PROGRAM STRATEGY
(CONTINUED)

CURRENT STATUS:

- 6.2 TECHNOLOGY BASE FIRMLY ESTABLISHED IN FDDI VOICE/DATA LANs

- 6.2 CONCEPT FEASIBILITY IN PROGRESS ON WIRELESS LANs

- 6.3A AUTOMATED NET MANAGEMENT UNDERWAY

- NDI SECURITY EVALUATION UNDERWAY

- 6.3A AUTO CONFIGURATION UNDERWAY

FUTURE STRATEGY

- COMPETITIVE PROCUREMENT OF ADM WIRELESS LAN

- ENLIST SETA CONTRACTOR SUPPORT FOR SAST SYSTEMS INTEGRATION

- RAPID PROTOTYPING SUPPORTED BY NDI TECHNOLOGY

- WIRELESS LAN ANTENNA PROTOTYPE DEVELOPMENT (TO BE DETERMINED)

- INTEGRATE VOICE AND DATA INTO ATCCS LOCAL AREA BY LEVERAGING COMMERCIAL DEVELOPMENTS

- FY 92 OBJECTIVES

  - CONTINUE LAB INTEGRATION/DEMO WITH AVAILABLE TECHNOLOGY PRODUCTS

  - COORDINATE WITH USER COMMUNITY

  - INITIAL DEMOS FOR PM CHS/PEO CCS

- FUTURE PLANS

  - EXPANSION OF TECHNOLOGY BASE PRODUCTS

  - SYSTEMS INTEGRATION

  - CONDUCT ADVANCED TECHNOLOGY DEMOS

  - INSERTION OF ATTD PRODUCTS INTO PM/PEO

SAST ATTD
CONTRACT OPPORTUNITIES

FY92: ASTI-TEED (6.2) [SEE INFOSEC BRIEF]

FY93: - WIRELESS LAN ANTENNA TECHNIQUES

- SAST SETA INTEGRATION/TEST SUPPORT

FY94: - WIRELESS LAN ADM PROCUREMENT

- ASTI-TEED (6.4) [SEE INFOSEC BRIEF]

CONTRACT OPPORTUNITY
(CONTINUED)

OBJECTIVE: TO PROVIDE SYSTEMS ENGINEERING/ INTEGRATION OF ALL ATCCS SYSTEMS UTILIZING SAST ATTD PRODUCTS

TYPE: CPFF

STATUS: 6.3A ADVANCED DEVELOPMENT

SCHEDULE: AWARD: 2Q FY93
CONTRACT LENGTH - 24 MONTHS

APPROXIMATE VALUE: $750K

POC/PHONE: CPT JAMES D. BASS/(908) 544-3697
LARRY LEVINE/(908)544-3697

CONTRACT OPPORTUNITY
(CONTINUED)

OBJECTIVE: WIRELESS LAN ANTENNA TECHNIQUES

TYPE: CPFF

STATUS: 6.3A ADVANCED DEVELOPMENT

SCHEDULE: AWARD: 1Q FY94
CONTRACT LENGTH – 18 MONTHS

APPROXIMATE VALUE: $1M

POC/PHONE: FRANK LOSO/(908) 544-4025
JAY STABA/(908)544-3988

CONTRACT OPPORTUNITY
(CONTINUED)

OBJECTIVE: WIRELESS LAN ADM PROCUREMENT

TYPE: CPFF

STATUS: 6.3A ADVANCED DEVELOPMENT

SCHEDULE: AWARD: 2Q FY94
CONTRACT LENGTH - 18 MONTHS

APPROXIMATE VALUE: $2M

POC/PHONE: FRANK LOSO/(908) 544-4025
JAY STABA/(908)544-3988

ADAPTIVE NETWORK PLANNING AND MANAGEMENT FOR THE LOCALIZED NETWORK ENVIRONMENT

(UNCLASSIFIED)

CHARLES J. GRAFF
PROJECT ENGINEER

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-TP-E

POINT PAPER

SUBJECT: Adaptive Net Planner and Management (ANPM)

OBJECTIVE: The goal of the Adaptive Net Planner and Management program is to develop the protocols and algorithms to provide a near real time planner for localized network voice, data, and video subscribers. Also to develop the protocols and algorithms to provide OSI-based network management for localized networks. The near term focus for this development is the SASTD 95 DEMO and the far term focus is the BIS 2015 architecture.

FACTS: The ANPM protocols and algorithms would provide an automated planner capability for the localized network subscribers. The automated planner must operate in near real time to support frequent user requirement changes as a result of battlefield dynamics and/or mission changes. The ANPM design for the localized network will be based on the current DOD protocols and algorithms. They will be enhanced to perform in the tactical environment and support evolution to OSI compatibilty.

The near term planner will focus on the data subscribers in the localized network environment consisting of FOTLAN, Wireless Lan, and ethernets. The results of the near term effort will be demonstrated in laboratory demonstrations with transitions to the SASTD DEMO. The far term effort will focus on voice/data/video subscribers in the localized network and OSI based network management for broadband ISDN and metropolitan area networks.

BRIEFER: Charles J. Graff, Prog. Eng., AMSEL-RD-C3-TP-E, 544-3264

MAJOR THRUSTS

- DEVELOPMENT OF NEAR REAL TIME PLANNER FOR LOCALIZED NETWORK VOICE, DATA, VIDEO SUBSCRIBERS

- DEVELOPMENT OF OSI-BASED NETWORK MANAGEMENT FOR LOCALIZED NETWORKS

  - FOTLAN

  - WIRELESS LAN

  - PACKET SINCGARS

  - TACTICAL METROPOLITAN AREA NETWORKS

  - TACTICAL B-ISDN

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ADAPTIVE NET PLANNER AND MANAGEMENT

## USER REQUIREMENTS/DEFICIENCIES

- NO PLANNER FOR LOCALIZED NETWORK SUBSCRIBERS

- PLANNING CANNOT BE DONE MANUALLY

- PLANNER MUST BE RESPONSIVE TO CHANGES FREQUENT USER REQUIREMENT DUE TO MISSION OR BATTLEFIELD CHANNELS

ADAPTIVE NET PLANNER AND MANAGEMENT
KEY OPERATIONAL CAPABILITIES

- PLANNER MUST OPERATE IN NEAR REAL TIME TO SUPPORT HIGH MOBILITY REQUIREMENTS

- PLANNER MUST BE SIMPLE TO OPERATE WITH MINIMUM USER TRAINING

- PLANNER MUST NOT CONFLICT WITH OR DUPLICATE ISYSCON

SASTD DEMO

- PACKET ORIENTED INTERNET LEVEL GATEWAY PROTOCOLS FOR THE TACTICAL MULTINET ENVIRONMENT.

- GATEWAY PROTOCOL PERFORMANCE WILL BE CHARACTERIZED WITH ACTUAL HARDWARE IN THE LABORATORY. TECHNOLOGY DEMOS TO BE PERFORMED IN LAB, LEADING TO SASTD ATTD.

- MANAGED SUBSCRIBERS ARE HOSTS ONLY

- VOICE/VIDEO SUBSCRIBERS FOR FOTLAN ARE UNMANAGED

TACTICAL WIDE AREA NETWORK

COMBAT NET RADIO

TACTICAL MULTINET GATEWAY

FIBER OPTIC LAN

ETHERNET

GATEWAY

WIRELESS LAN
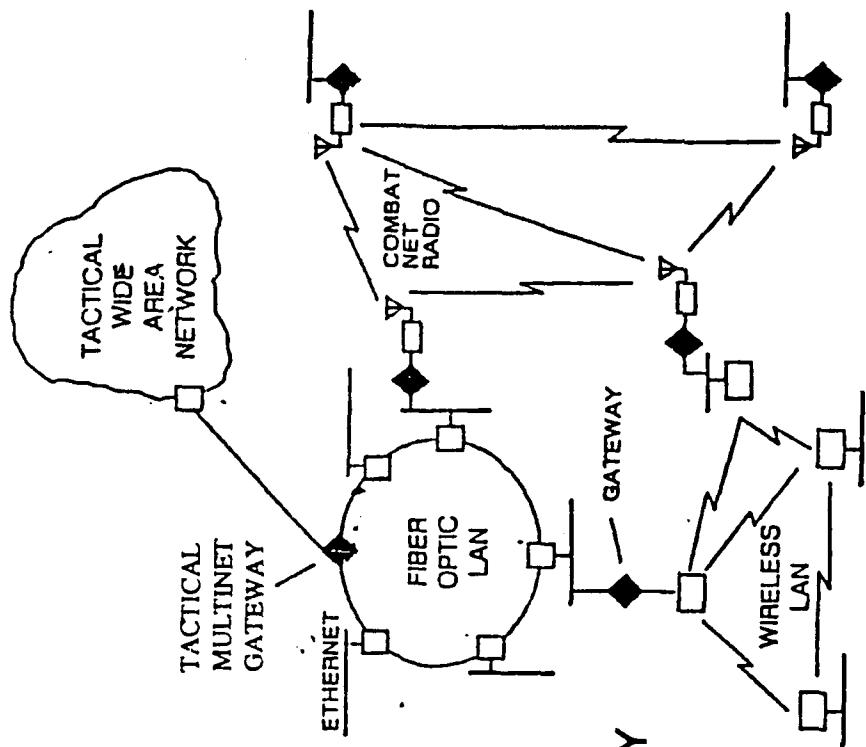
OBJECTIVES

- FOCUS
  - SASTD 95 DEMO

- SUBSCRIBERS
  - PACKET DATA ONLY

- PLANNING FUNCTION
  - (MSE FUNDED) FOR MSE SUBSCRIBERS

- NET MGMT FUNCTION
  - ANM AS PART OF SASTD FOR PACKET DATA ONLY

- GATEWAY FUNCTION
 - PACKET DATA GATEWAY TO INTERCONNECT MSE

LONG TERM OBJECTIVES

- **SUBSCRIBERS MAY BE VOICE/DATA/VOICE**

- **PLANNER FOR ALL SUBSCRIBERS IN LOCALIZED NETWORK**

- **TACTICAL GATEWAYS HANDLE VOICE/DATA/VIDEO**

- **NETWORK MANAGEMENT OSI-BASED**

ROAD MAP

ADAPTIVE NETWORK PLANNING AND MANAGEMENT

92	93	94	95	96	97

Algorithm Design Study

Algorithm Development

Prototype Implementation

Evaluation/Characterization

To SASTD ATTD

Technology Demonstrations
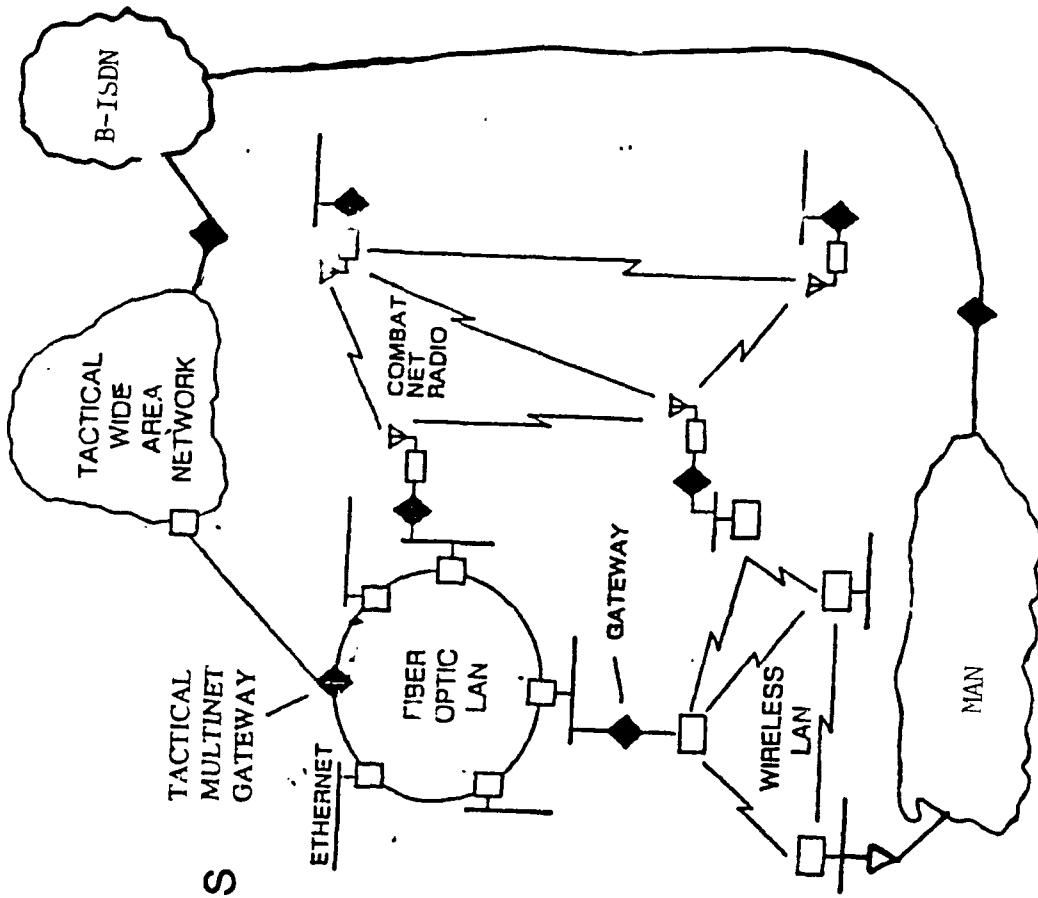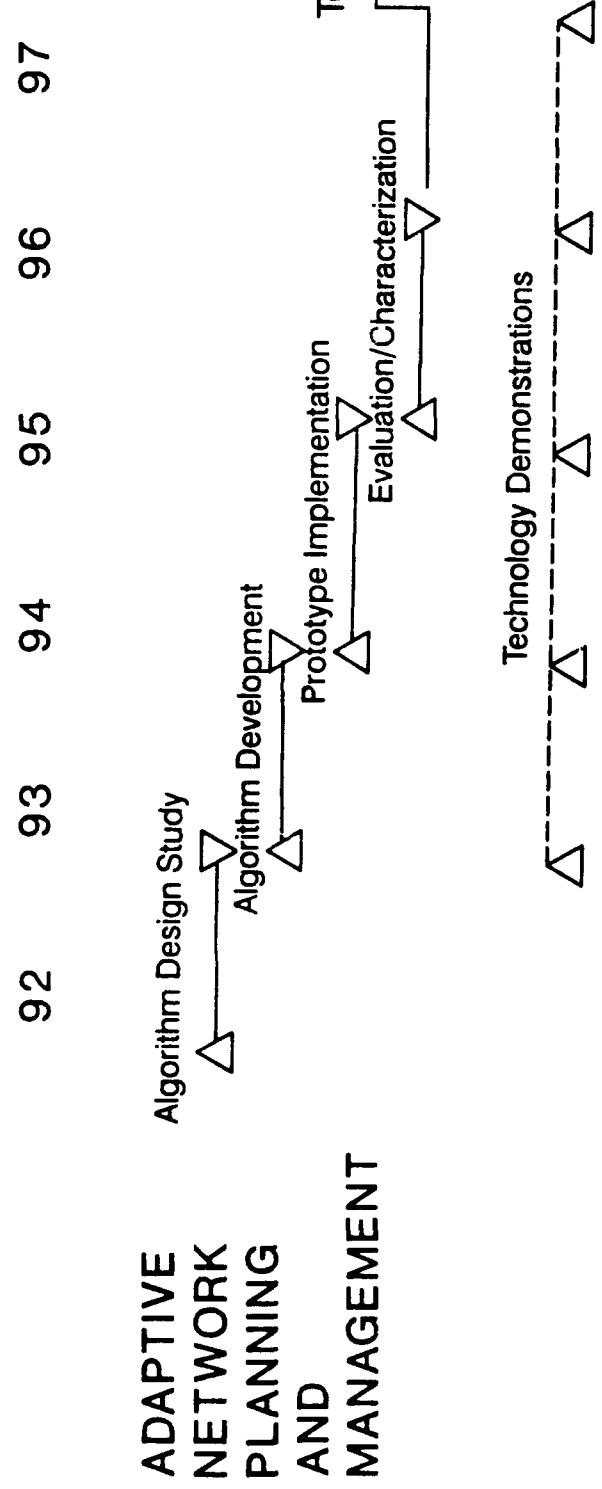
CONTRACT OPPORTUNITY
ADAPTIVE NETWORK MANAGEMENT & PLANNING

OBJECTIVE: - DESIGN, DEVELOP PROTOTYPE
PLANNER FOR LOCALIZED NETWORK
ACCESS SUBSCRIBERS (PACKET
DATA ONLY)

- DEMO PROTOTYPE IN LAB ENVIRONMENT

TYPE: CCMPETITIVE, CPFF

STATUS: 6.2 EXPLORATORY DEVELOPMENT

SCHEDULE: AWARD DATE - 2Q FY93
CONTRACT LENGTH - 24 MONTHS

APPROX. VALUE: <$600K

P'OC/PHONE: CHARLES J. GRAFF, (908)544-3264

SOLDIER'S COMPUTER

(UNCLASSIFIED)

JAMES G. WRIGHT
ELECTRONICS ENGINEER

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-WA

POINT PAPER

SUBJECT: Soldier's Computer Industry Opportunities

PURPOSE: The Soldier's Computer is being developed as one
subsystem of 'the Soldier System' (see APBI Proceeding, C3I
Opportunities through 1996 and Beyond, 16-17 July 1991).

FACTS:

    o   The Objective is to enhance the unit and individual
soldier battlefield capabilities of lethality, C2, mobility,
sustainment, protection, and survivability.

    o   The computer systems will consist of a mission
configurable computer, heads-up display and a voice/data LAN
tieing together squad members, supporting features such as
pre-formatted message generation, video capture, embedded GPS and
battlefield overlays.

    o   The basic computer, peripherals and software are
expected to be NDI while the helmet display, applications
software and special peripherals may require development. The
Soldier's Computer development will be coordinated with the
proposed PM Soldier office and other PM's developing Soldier
System equipment.

BRIEFER: James G. Wright, GS-13, AMSEL-RD-C3-LA-F.
(908) 544-2819

                                        ACTION OFFICER:
                                        JAMES G. WRIGHT
                                        GS-13
                                        ELECTRONICS ENGINEER

PROGRAM THRUST
USER REQUIREMENTS

- ENHANCE SOLDIER'S BATTLEFIELD CAPABILITIES

    - LETHALITY

    - COMMAND & CONTROL

    - MOBILITY

    - SUSTAINMENT

    - PROTECTION/SURVIVABILITY

    - PERSONNEL/TRAINING

PROGRAM THRUST
KEY OPERATIONAL CAPABILITIES

- PREFORMATTED MESSAGES

- VIDEO CAPTURE

- EMBEDDED GPS

- MAPPING & OVERLAYS

- TRAINING

- FIELD DIAGNOSTICS

1 Aug 91

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PROGRAM STRATEGY
CURRENT INTEGRATION STATUS

INHOUSE PROGRAM PROGRAM UNDERWAY TO
SUPPORT ATTD FOR SOLDIER'S
INTEGRATED PROTECTIVE ENSEMBLE
(SIPE)

- COMPUTER
- BASIC PERIPHERAL
  (INPUT DEVICE, BATTERY)
- BASIC SOFTWARE
  (OPERATING SYS, DATABASE)

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PROGRAM STRATEGY
FUTURE INTEGRATION STRATEGY

- HELMET DISPLAY

- SENSORS (MEDICAL, LASER, AUDIO)

- APPLICATION

SOLDIER'S COMPUTER

FY 92 OBJECTIVES:

- CONTINUE IN-HOUSE DEVELOPMENT OF COMPUTER TO SUPPORT SIPE ATTD

- CONTINUE DEVELOPMENT OF APPLICATION SOFTWARE TO SHOW POTENTIAL APPLICATION AT ATTD

SOLDIER'S COMPUTER

FUTURE PLANS (FY 93 AND BEYOND):

- SUPPORT SIPE ATTD (FY 93)

- CONTINUE APPLICATION DEVELOPMENT ON TEST BED TBD (FY 93)

Soldier's Computer Schedule

90 91 92 93 94 95 96 97 98 99 00

SIPE ATTD

| Trans. |

TEISS (PM SOLDIER)

| 6.3b Adv Dev | 6.4 Eng Dev | Prod/Field |

SOLDIER'S COMPUTER DEVELOPMENT ITEMS (VARIOUS PMs)

| 6.3b Adv Dev | 6.4 Eng Dev | Prod/Field |

SOLDIERS COMPUTER NDI ITEMS (PM CHS)

| Procurement Cycle | Delivery |

* PROGRAM IS CURRENTLY UNFUNDED FOR 93 AND BEYOND

CONTRACT OPPORTUNITY
SOLDIER PERSONAL SYSTEM CONTROLLER

OBJ: • DEVELOP 1 lb TACTICAL COMPUTER WITH APPLICATION CARDS

    - TO SUPPORT GPS
        - COMMUNICATIONS
        - VIDEO RECONNAISSANCE

    • DELIVERY OF PROTOTYPES AND DEMONSTRATION

TYPE: COMPETITIVE, CPFF

STATUS: 6.3B DEVELOPMENT

SCHEDULE: AWARD DATE - 2Q FY94
          CONTRACT LENGTH - 24 MONTHS

APPROX. VALUE: <$2 MILLION

POC/PHONE: JAMES WRIGHT COM 908 544-2034

CONTRACT OPPORTUNITY
SOLDIER PERSONAL SYSTEM APPLICATION

OBJ: • DEVELOP SOFTWARE SYSTEM INTEGRATION TO SUPPORT

- GPS
- COMMUNICATIONS
- VIDEO RECONNAISSANCE
- HEADS UP DISPLAY
- INPUT DEVICES
- SENSORS
- CUSTOM USER APPLICATION

• DELIVERY OF PROTOTYPES AND DEMONSTRATION

TYPE: COMPETITIVE, CPFF

STATUS: 6.3B DEVELOPMENT

SCHEDULE: AWARD DATE - 2Q FY94
CONTRACT LENGTH - 12 MONTHS

APPROX. VALUE: <$1 MILLION

POC/PHONE: JAMES WRIGHT COM 908 544-2034

SUMMARY OF CONTRACTOR OPPORTUNITIES

YR	TITLE	AMOUNT
FY94-97	SOLDIER PERSONAL SYSTEM CONTROLLER	<$2M
FY94-96	SOLDIER PERSONAL SYSTEM APPLICATION	<$1M

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USER INTERFACE TECHNOLOGY

(UNCLASSIFIED)

JOHN E. QUIGLEY

CHIEF, DISTRIBUTED SYSTEM/PROCESSING BRANCH

CECOM CENTER FOR C3 SYSTEMS

POINT PAPER

SUBJECT: User Interface Technology

OBJECTIVE: User Interface Technology (UIT) provides for the development, integration, demonstration and transition of next-generation soldier-machine interface (SMI) technologies to standardize user-transparent/user-friendly interfaces to the Army Tactical Command, Control and Communications System (ATCCS) at all echelons and improve users interaction with ATCCS, enabling user input, access, processing, and assimilation of battlefield information efficiently in real time with little training.

FACTS: User requirements include the need for tactical user interfaces that are natural, easy to learn and use, consistent across various systems and machines, highly mobile and appropriate for geographically distributed C2 systems to enable unsophisticated users to easily and quickly access tactical information. These interfaces are critical to support the ever-increasing amount of voice, intelligence, logistics, imagery, and other C2 information collected from a wide variety of multiplatform/multispectral sensors and multiple data inputs such as mouse, voice, joystick, etc. to insure that a standardized approach will result in handling input and output in the same manner in different systems.

In satisfying these requirements, prioritization and human engineering are also needed to determine the precedence of the manner in which information that must be input, processed, and ultimately displayed to military decision makers is handled for different systems. Significant improvements in the ease of interface along with the reduction in the time needed to interact with a C2 system will increase the efficiency of personnel, enabling planning to be performed more easily and reactions to take place automatically without specific directed effort. These attributes may lead to a reduction in the number of operational personnel needed by reducing the degree of dedicated effort for machine interaction.

The availability of a consistent, simple, easy-to-use interface to all systems is needed that will allow the soldier to improve effectiveness by performing necessary input/output functions more rapidly and efficiently, thereby freeing him to concentrate on survivability and other aspects of mission performance rather than on the mechanics of how to interact with computer systems. Through the application of advanced UIT, the capability to reliably access vast quantities of data and information to interrogate, display, and manipulate easily and efficiently is expected to be possible without the need for extensive computer experience.

Whereas current ATCCS systems require standard keyboard or pointing device to interact with the system, require trained users, is prone to errors, and is time consuming, UIT will demonstrate that user interface to a C2 system can be humanly natural and machine independent so that with very little training, an unsophisticated user can easily and effectively use a sophisticated and powerful C2 system with capabilities for user-friendly voice input/output; natural language interface that will allow direct interaction with the database frame structure in systems such as the the Maneuver Control System (MCS) using voice as well as typed commands; advanced display techniques that use voice, data, video, imagery, maps, three-dimensional color, and terrain information for vital C2; touch screens; flexible self-defined menus; multimedia (voice, data, text, spreadsheets, images, maps, etc.) information systems, presentation synchronization and real-time message exchange capability; advanced terrain reasoning and visualization; and video compression; all of which will serve to demonstrate enhanced transitional soldier-machine interfaces and enable flexible integration of soldier processes in an interactive environment.

Key operational capabilities to be achieved through improved UIT include more thorough understanding of the battlefield situation, greater ability to visualize and evaluate the various options available, reliable user identification and voice authentication, fewer misunderstandings or mistakes due to confusion caused by inconsistent data presentations, reduced user workload and fatigue, and improved efficiency in stressful, time-critical situations.

UIT will be hardware independent through use of an open architecture, provide a standardized windowing environment for keyboard, display, and graphics pointing devices that will support future multimedia C2 application programs, and perform the following subfunctions: SMI initialization, SMI termination, display management, forms processing, overlay graphics processing electronic map background processing menu processing alert processing primitive object support printing.

UIT will provide hardware and software elements operating on Army Common Hardware and Software (CHS) system the capability to: accept multimedia data input from the user or from sensors, manipulate and process the data into information that can be efficiently transported, and display or output the information in a multimedia format.

BRIEFER: John E. Quigley, Chief, Distributed Systems/Processing Branch, AMSEL-RD-C3-CC-D, (908) 544-4416.

JOHN E. QUIGLEY
Chief, Distributed Systems/Processing Branch
(908) 544-4416

MAJOR THRUSTS

- VOICE INTERFACE

- NATURAL LANGUAGE

- TERRAIN VISUALIZATION/NAVIGATION

- DISPLAY TECHNOLOGY

- MULTIMEDIA MESSAGING

VOICE INTERFACE

USER REQUIREMENTS/DEFICIENCIES

- VOICE I/O FOR USER AUTHENTICATION, DIRECT DATA ENTRY, MULTIMEDIA CONFERENCING AND MESSAGING, AND REAL-TIME COORDINATION OF THE BATTLEFIELD

- A NEED FOR STANDARDIZATION

- ABILITY TO MANAGE AND UNDERSTAND LARGE AMOUNTS OF MULTIMEDIA DATA

VOICE INTERFACE

KEY OPERATIONAL CAPABILITIES

- PROVIDES USER WITH AN ALTERNATE INPUT MODE IN ENVIRONMENTS THAT WOULD NOT NORMALLY PERMIT HUMAN-COMPUTER INTERACTION

- INCREASE OPERATOR/USER MOBILITY

- INCREASE SPEED

- EASE OF EXPRESSION

ADDITIONAL CONSIDERATIONS

VOICE INTERFACE

- EXPLOIT COTS HARDWARE AND SOFTWARE FOR PCs RUNNING IN MS-DOS AND UNIX ENVIRONMENTS INITIALLY

- TRANSITION TO CHS PLATFORMS

PROGRAM STRATEGY

VOICE INTERFACE

- CURRENT STATUS

  - COMPLETED SBIR PHASE I CONTRACTURAL EFFORT CONCERNING THE APPLICATION OF VOICE RECOGNITION TECHNOLOGY TO THE CONTROL OF UNIX-BASED ARMY C2 COMPUTER APPLICATIONS

- FUTURE STRATEGY

  - DEVELOP A LOOSELY CONSTRAINED AND FREE FORM INPUT SYSTEM
  - BETTER SYSTEM FOR ERROR HANDLING

NATURAL LANGUAGE
USER REQUIREMENTS/DEFICIENCIES

- A NATURAL LANGUAGE INTERFACE IS NEEDED TO ALLOW DIRECT INTERACTION WITH MCS DATABASE FRAME STRUCTURE USING VOICE AS WELL AS TYPED COMMANDS

- MULTI NATIONAL OPERATION AND INTELLIGENCE GATHERING REQUIRES MACHINE TRANSLATION OF TEXT AND VOICE

NATURAL LANGUAGE
KEY OPERATIONAL CAPABILITIES

- EXPEDITE THE INFORMATION GATHERING PROCESS, REDUCE ERRORS IN DATA ENTRY AND RETRIEVAL, PROVIDE A MORE NATURAL INTERACTION TECHNIQUE TO THE SYSTEM

- ALLOW THE COMMANDER TO CONCENTRATE ON THE DECISION-MAKING PROCESS INSTEAD OF ON HOW TO "USE" THE C2 SYSTEM

- SCAN LARGER VOLUME OF MESSAGE AND INTELLIGENCE DATA FOR KEY FACTS

- TRANSLATE PREVIOUSLY UNINTELLIGIBLE MESSAGES

ADDITIONAL CONSIDERATIONS
NATURAL LANGUAGE

- DEMONSTRATE MCS NATURAL QUERY SYSTEM ON A PC INITIALLY

- TRANSITION TO CHS PLATFORMS

- EXPAND QUERY CAPABILITY BASE ON FIELD CORPUS DATA

- FILTER AND UNDERSTAND MESSAGE TO AUTO-MATICALLY NOTIFY OPERATOR OR UPDATE DATA BASE

- EXPAND/ADOPT EXISTING TRANSLATION SYSTEMS FOR MILITARY MESSAGE CORPUS DATA

- ADD NEW LANGUAGE FOR INTELLIGENCE GATHERING

PROGRAM STRATEGY
NATURAL LANGUAGE

- CURRENT STATUS

  - DEVELOPED THE PROTOTYPE NATURAL LANGUAGE SYSTEM FOR MCS (PC BASED RESEARCH DEMONSTRATION SYSTEM)

  - DEVELOPED RESEARCH MACHINE TRANSLATION SYSTEM FOR FRENCH-ENGLISH (NATO STANAG DOMAIN)

  - DEBUGGED AND MODIFIED GERMAN-ENGLISH MACHINE TRANSLATION SYSTEM OBTAINED FROM LUND UNIVERSITY, SWEDEN, INTO DEMONSTRATION SYSTEM FOR MILITARY DOMAIN PER REQUEST OF FBL

PROGRAM STRATEGY
NATURAL LANGUAGE

- FUTURE STRATEGY

  - DEMONSTRATE MCS NATURAL QUERY SYSTEM ON A PC AT FBL

  - DEMONSTRATE ON AND TRANSISTION TO CHS PLATFORMS

  - EXPAND DATA BASE QUERY SYSTEM COVERAGE

  - ENHANCE EXISTING MACHINE TRANSLATION (M.T.) SYSTEMS FOR MILITARY MESSSAGE COVERAGE

  - ADD NEW LANGUAGES FOR INTELLIGENCE COMMUNITY

FY 92 OBJECTIVES

- EXPAND NATURAL LANGUAGE QUERY SYSTEM

- EXPAND GRAMMAR COVERAGE

- ADD NEW LANGUAGE

FUNDING PROFILE

	RDTE $M	PROC $M	OMA $M
FY92	0.4	0	0
FY93	0.5	0.3	0
FY94	0.5	0.3	0.1
FY95	0.6	0.5	0.1
FY96	0.6	0.5	0.1

TERRAIN VISUALIZATION/NAVIGATION
USER REQUIREMENTS/DEFICIENCIES

- DEVELOP THE FAULT TOLERANT PARALLEL PROCESSOR (FTPP) ARCHITECTURE AND THE COMPONENTS WHICH WOULD ENSURE COMMONALITY BETWEEN ARMY GROUND AND AIR VEHICLES

- DEVELOP AND DEMONSTRATE A VALIDATED FAULT TOLERANT COMPUTER WHICH MEETS THE ULTRA-HIGH RELIABILITY/THROUGHPUT REQUIREMENTS OF FUTURE SYSTEMS WHICH HAVE MISSION CRITICAL COMPUTING NEEDS

TERRAIN VISUALIZATION/NAVIGATION
KEY OPERATIONAL CAPABILITIES

- CAPABLE OF PROCESSING A NUMBER OF REAL-TIME APPLICATIONS AND MAINTAIN THE RELIABILITY AND THROUGHPUT REQUIREMENTS

TERRAIN VISUALIZATION/NAVIGATION
ADDITIONAL CONSIDERATIONS

- THE STANDARD ARMY VETRONICS ARCHITECTURE (SAVA) COMPONENTS BOARDS AND ARCHITECTURE WILL BE INVESTIGATED TO DETERMINE HOW SAVA CAN BE UTILIZED

- MOST OF THE AFTA DESIGN WILL BE CAPTURED IN THE VHSIC HARDWARE DESCRIPTION LANGUAGE (VHDL)

- JOINT EFFORT BETWEEN CECOM AND AVRADA

TERRAIN VISUALIZATION/NAVIGATION
PROGRAM STRATEGY

- THE CONCEPTUAL STUDY HAS BEEN COMPLETED WHICH DEVELOPED THE CONCEPT FOR THE FAULT TOLERENT PARALLEL PROCESSOR (FTPP) APPLICATION FOR THE ARMY FAULT TOLERENT ARCHITECTURE (AFTA)

- THE DESIGN PHASE OF THE AFTA PROGRAM IS UNDERWAY TO DEVELOP THE BRASSBOARD DESIGN OF THE AFTA FTPP

- INVESTIGATING CANDIDATE TERRAIN VISUALIZATION/ NAVIGATION PRODUCTS

- COORDINATION INITIATED WITH TACOM AND ARDEC

- CONDUCTED A MAP/TERRAIN ANALYSIS WORKSHOP

TERRAIN VISUALIZATION/NAVIGATION
FUTURE STRATEGY

- COMPLETE THE DESIGN AND CONSTRUCT A BRASSBOARD OF THE FTPP

- DEMONSTRATE THE PROTOTYPE FTPP

TERRAIN VISUALIZATION/NAVIGATION

FY 92 OBJECTIVES

- COMPLETE FTPP DESIGN

- OBTAIN TERRAIN VISUALIZATION/NAVIGATION
  APPLICATION SOFTWARE

- BEGIN CONSTRUCTION OF BRASSBOARD

FUTURE PLANS (FY 93 AND BEYOND)

- OBTAIN LABORATORY PROTOTYPE OF FTPP AND
  INTEGRATE APPLICATION SOFTWARE

- DEMONSTRATE FTPP WITH GROUND VEHICLE
  APPLICATIONS

FUNDING PROFILE

	RDTE $M	PROC $M	OMA $M
FY92	0	0.1	0
FY93	0	0.3	0

DISPLAY TECHNOLOGY
USER REQUIREMENTS/DEFICIENCIES

- ABLE TO DISPLAY A WIDE VARIETY OF DATA RANGING FROM SIMPLE TEXT AND GRAPHICS TO IMAGERY AND 3-D TERRAIN VIEWS

- THE USER INTERFACE AND DISPLAYS ON ALL PROCESSORS SHOULD BE CONSISTANT TO SUPPORT THE CHANGING USER REQUIREMENTS

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DISPLAY TECHNOLOGY
KEY OPERATIONAL CAPABILITIES

- IMPROVE THE USER'S EFFICIENCY AT ENTERING OR EXTRACTING INFORMATION FROM THE C3 SYSTEM BY PROVIDING AN OPEN ARCHITECTURE, STANDARDIZED WINDOWING ENVIRONMENT FOR KEYBOARD, DISPLAY, AND GRAPHICS POINTING DEVICES THAT WILL SUPPORT FUTURE MULTIMEDIA C2 APPLICATION PROGRAMS

- THE ADVANCED DISPLAY TECHNOLOGIES WILL PROVIDE A BETTER UNDERSTANDING OF THE BATTLE SITUATION AT ANOTHER PLACE OR TIME

DISPLAY TECHNOLOGY
ADDITIONAL CONSIDERATIONS

- INTEGRATE AND ENHANCE A CURRENTLY EMERGING SET OF TECHNOLOGIES INCLUDING THE X WINDOWS INTERFACE AND LARGE, COLOR PROJECTION DISPLAY THAT CAN BE TRANSITIONED INTO CHS PLATFORMS

MULTIMEDIA MESSAGING
USER REQUIREMENTS/DEFICIENCIES

- CORRECT, EXPEDIENT, REAL-TIME, AND MULTIMEDIA INFORMATION EXCHANGE ARE REQUIRED IN BOTH THE ATCCS AND BIS-2015 ENVIRONMENTS

- TELEVIDEO CONFERENCING IN SUPPORT OF THE FORCE LEVEL CONTROL SYSTEM

MULTIMEDIA MESSAGING
KEY OPERATIONAL CAPABILITIES

MULTIMEDIA CONFERENCING, MESSAGING, AND DATA TRANSFER WILL INCREASE PRODUCTIVITY AND SURVIVABILITY

MULTIMEDIA MESSAGING
ADDITIONAL CONSIDERATIONS

- COMMERCIALLY AVAILABLE AND EMERGING TECHNOLOGIES WILL BE INTEGRATED AND ENHANCED SO THAT A CAPABLE BASELINE MULTIMEDIA MESSAGING MAY BE ACHIEVED FOR USE IN ATCCS

- PORTED ONTO CHS PLATFORMS

- CAPTURED THE EXPERIENCE THAT WE HAVE IN THE AREA OF MULTIMEDIA COMMUNICATION SYSTEMS (I.E. MULTIMEDIA MESSAGE PROTOCOL DEVELOPMENT AND DEFINITION AND IMPLEMENTATION OF MULTI-MEDIA DOCUMENT STANDARDS) INTEGRATE, AND ENHANCE THEM SO THAT THEY CAN BE DEPLOYED IN TACTICAL ENVIRONMENTS.

CONTRACT OPPORTUNITY
USER INTERFACE TECHNOLOGY (UIT)

OBJECTIVE: EVALUATION OF USER INTERFACE TECHNOLOGY AND PROTOTYPE PRODUCTS

FY93: EVALUATE UIT CAPABILITIES TO CORRELATE INFORMATION TO GENERATE BATTLEFIELD PICTURE

FY94: CONDUCT UIT DEMONSTRATION NEEDED FOR B2C2 ATTD

TYPE: COMPETITIVE, CPFF

STATUS: 6.3A DEVELOPMENT

SCHEDULE: AWARD DATE - 1Q FY 93
CONTRACT LENGTH - 24 MONTHS

APPROXIMATE VALUE: <$1M

POC/PHONE#: JOHN QUIGLEY, (908)544-4416/AV995-4416

PROGRAM SUMMARY

USER INTERFACE TECHNOLOGY DEMONSTRATION

- PROVIDE AN ENVIRONMENT FOR EVALUATION OF EMERGING UI TECHNOLOGIES AGAINST ATCCS OBJECTIVE SYSTEM REQUIREMENTS

- PROVIDE INTERIM DEMONSTRATION OF DEVELOPING AND EMERGING TECHNOLOGIES AND PRODUCTS

- INTEGRATE EMERGING DISPLAY STANDARDS, PRODUCTS, AND TOOLS INTO PROTOTYPE SYSTEMS OF CHS PLATFORMS

- DEMONSTRATE ADVANCED USER INTERFACE TECHNOLOGY ADVANTAGES AND CAPABILITIES IN AN OPERATIONAL SCENARIO

LOWER ECHELON COMMAND AND CONTROL

UNCLASSIFIED

JOHN W. STROZYK
CHIEF, LOWER ECHELON C2 BRANCH

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-CC-L (70)

POINT PAPER

SUBJECT: Development of Automated Command and Control Battlefield Operations Systems Concepts

PURPOSE: Using low cost, rapid prototyping capabilities, and existing and new automation software applications or processes, develop, evaluate and refine automation applications, appropriate and applicable, to the execution of command and control processes for US Army units of brigade and below sizes regardless of mission dependence. Extend, integrate and enhance the ATCCS concepts such that life cycle costs are reduced, or at a minimum, not increased.

FACTS:

* Present command and control for all units is not automated

* Present practices, procedures and processes are not standardized relative to automation

* Both automation and its application to C2, and the practices, procedures, processes and doctrine are evolving

* An interactive "developer" - "user" process based on rapid prototyping concepts can accelerate and enhance fielding of automation aids for C2

* ACCS/ATCCS common hardware/software extensions can minimize and/or reduce associated life cycle and development costs.

OPPORTUNITIES FOR CONTRACTORS:

* Selection of low cost, graphical interface capable, government owned-supported Rapid Prototyping software maximizes multiple contractor participation in modular applications development

* Although an integrated, seamless, command and control battlefield operating system development is targeted, subsystem development, existing software insertion, and prototyping of specialized (unique) C2 needs, suggests a requirement for system software integration will exist.

* Rapid Prototyping, demonstration, evaluation and refinement require establishment, maintenance and support of B2C2 Functionality test Bed capability, possibly in several locations. Test support and test documentation is involved.

* Transitional documentaton preparation and software configuration management support will be required.

BRIEFER: TBD - JOHN W. STROZYK

RELEASED BY:
JOHN W. STROZYK
GM-14
Ch, Lower Echelon C2 Br
x43244/44929

ACTION OFFICER:
JOHN W. STROZY.
GM-14
Ch, Lower Echelon C2 Br
x43244/44929

MAJOR THRUSTS

APPLICATION OF ADVANCED TECHNOLOGY, LOW COST, RAPID PROTOTYPING FOR:

- DEVELOPMENT OF AUTOMATED, INTEGRATED, MODULAR COMMAND AND CONTROL BATTLEFIELD OPERATING SYSTEMS (C2BOS) CONCEPTS

- APPLICATION OF EVOLVING C2 BOS CONCEPTS TO BRIGADE, BATTALION AND BELOW PROCESSES

- INTEGRATION OF C2 BOS FUNCTIONAL MODULES IN ATCCS – CHS – MCS PLUS

- EVOLUTION OF C2 BOS CONCEPT FOR ACCS/ATCCS EXTENSION AND ENHANCEMENT

- DEMONSTRATION OF REDUCED SOLDIER BURDEN AND ENHANCED SOLDIER/UNIT CAPABILITY
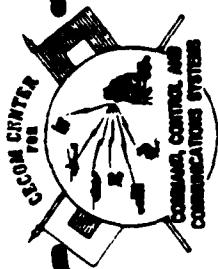
COMBINED ARMS B2C2 OPERATIONAL SLICE

ATCCS/FLCS

CECOM CENTER FOR COMMAND, CONTROL AND COMMUNICATIONS SYSTEMS

TGPSJv215
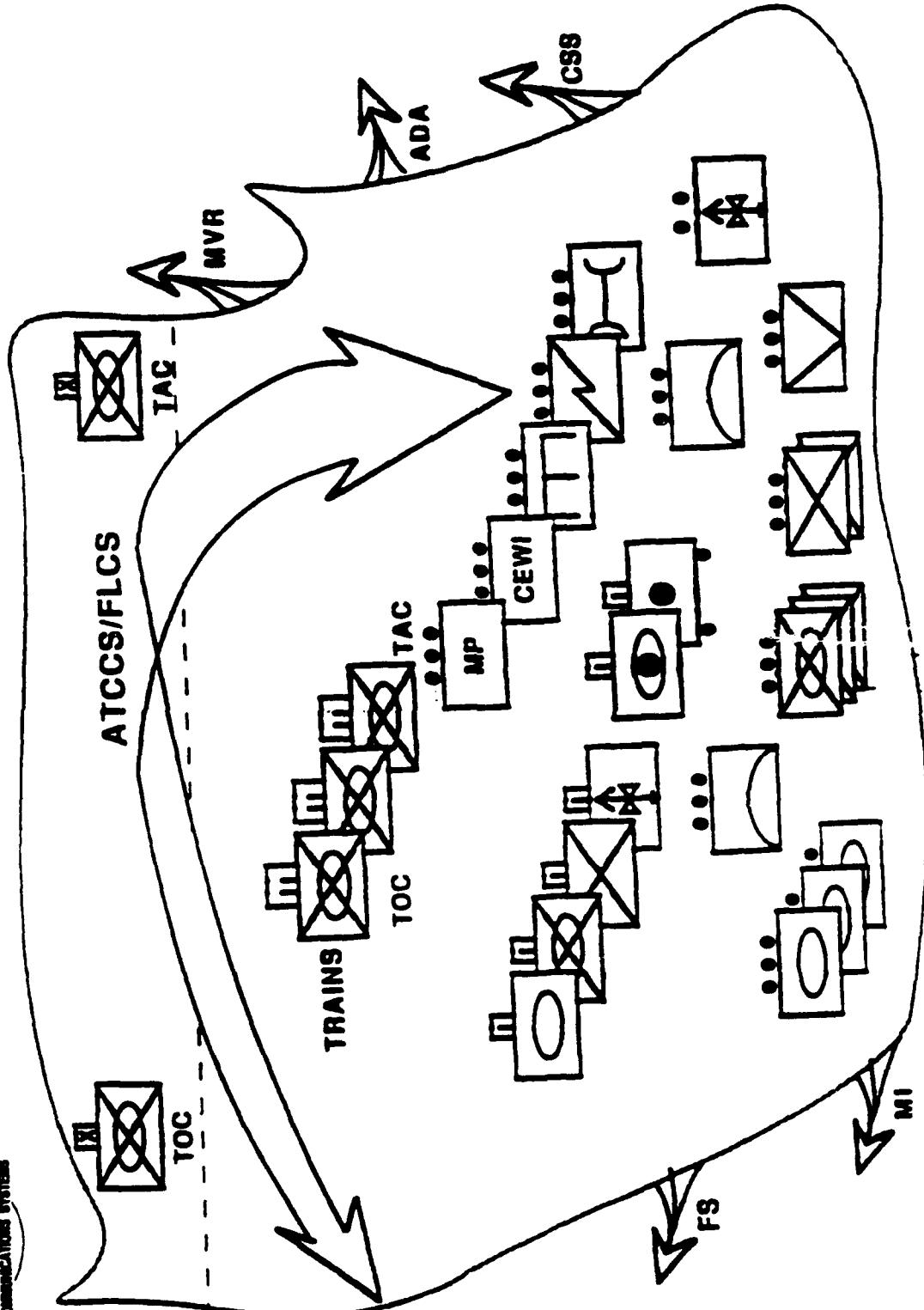
USER REQUIREMENTS/DEFICIENCIES

- PRESENT COMMAND AND CONTROL FOR ALL UNITS IS NOT AUTOMATED:

  - INABILITY TO COMPLETE/ACCOMPLISH COMMAND-LEADERSHIP TASKS

  - INABILITY TO OPTIMIZE FORCE SYNCHRONIZATION

  - TIME MANAGEMENT DECISIONS

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USER REQUIREMENTS/DEFICIENCIES
(CONTINUED)

- PRESENT PRACTICES, PROCEDURES AND PROCESSES ARE NOT STANDARDIZED

  - NON-UNIFORM AVAILABILITY/CAPABILITY/PROCESS/ PRACTICES

  - INADEQUATE/NON-UNIFORM, CONCEPT OF OPERATION (MISSION)

  - IGNORANCE OF FORCE-UNIT STATUS-SITUATION

  - LOST DETAILS

  - INADEQUATE BATTLE RELATED INFORMATION EXCHANGE (REPORTING)

USER REQUIREMENTS/DEFICIENCIES
(CONTINUED)

- AUTOMATION AND ITS APPLICATION TO C2 ALONG WITH THE PRACTICES, PROCEDURES, PROCESSES AND DOCTRINE ARE EVOLVING

- ACCS/ATTCS COMMON HARDWARE/SOFTWARE EXTENSIONS CAN MINIMIZE AND/OR REDUCE ASSOCIATED LIFE CYCLE AND DEVELOPMENT COSTS

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KEY OPERATIONAL CAPABILITIES

- AUTOMATION OF C2 PROCESSES/PROCEDURES

- USER FRIENDLY

- UNIFORMITY/CONSISTANCY OF FORCE-UNIT OPERATIONS CONCEPT

- INCREASED DETAIL/PARTICIPATION/TASK TIME ALLOWANCE

- RAPID SYNCHRONIZATION RECOGNITION/PROBLEM AWARENESS

- IMPROVED, AUTOMATIC REPORTING PRACTICES - CRITICAL/NON-CRITICAL

- INITIATIVE/OPPORTUNITY RECOGNITION

ADDITIONAL CONSIDERATIONS

- ENHANCED TACTICAL OPERATIONS (IMPROVED PRODUCT)

- REDUCED PERSONNEL BURDEN (EFFICIENCY-WORKLOAD-TIME)

- REDUCED TRAINING REQUIREMENTS

- CONOPS SUPPORT

- REDUCED COMMUNICATIONS/BANDWIDTH REQUIREMENTS

- REDUCED LIFE CYCLE MATERIAL COSTS

- ENHANCED EVOLUTION OF DOCTRINE, PRACTICES, PROCESSES AND TECHNIQUES

- REDUCTION IN INTEROPERABILITY AND CROSS FUNCTIONAL AREA ENGINEERING DEVELOPMENT COSTS

PROGRAM STRATEGY

- CURRENT STATUS:

  - RAPID PROTOTYPING FOR USER EVALUATION/VERIFICATION OF APPLICABILITY

- FUTURE STRATEGY:

  - INTEGRATION WITH ATCCS

- FY 92 OBJECTIVES:

  - CONTINUE PROTOTYPING

  - PROVIDE TO USER COMMUNITY
    FOR EVALUATION

  - INITIAL INTEGRATION WITH ATCCS

- FUTURE PLANS:

  - CONTINUE INTEGRATION WITH ATCCS

  - SYSTEMS INTEGRATION LEADING TO
    ATTD

CONTRACT OPPORTUNITY

BATTALION AND BELOW COMMAND AND CONTROL (B2C2)

OBJECTIVE: SYSTEM INTEGRATION FOR ADVANCED TECH-NOLOGY TRANSITION DEMONSTRATION (ATTD)

FY92: DEVELOPMENT IN SUPPORT OF ATTD PLANNING

FY93: SYSTEMS INTEGRATION LEADING TO FY94 ATTD

TYPE: COMPETITIVE, CPFF

STATUS: 6.3A DEVELOPMENT

SCHEDULE: AWARD DATE - 3Q FY 92
CONTRACT LENGTH - 24 MONTHS

APPROXIMATE VALUE: <$1M

POC/PHONE#: JOHN STROZYK, (908)544-3244/AV995-3244

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CONTRACT OPPORTUNITY

BATTALION AND BELOW COMMAND AND CONTROL (B2C2)

OBJECTIVE: ADVANCED TECHNOLOGY TRANSITION DEMON-STRATION (ATTD)

FY94: B2C2 DEMONSTRATIONS

FY95-96: B2C2 ATTD AND INTEGRATION WITH ATCCS

TYPE: COMPETITIVE, CPFF

STATUS: 6.3A DEVELOPMENT

SCHEDULE: AWARD DATE - 1Q FY 94
CONTRACT LENGTH - 36 MONTHS

APPROXIMATE VALUE: <$6M

POC/PHONE#: JOHN STROZYK, (908)544-3244/AV995-3244

TACTICAL MULTINET GATEWAY FOR THE LOCALIZED NETWORK ENVIRONMENT

UNCLASSIFIED

MICHAEL BERESCHINSKY

PROJECT ENGINEER

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-CC-D

POINT PAPER

SUBJECT: Tactical Multinet Gateway (TMG)

OBJECTIVE: The goal of the Tactical Multinet Gateway (TMG) program is to
develop the protocols and algorithms necessary to evolve from the
manual gateway capabilities of the current localized network environment
of the ATCCS to the automatic gateway capabilities needed for the near
term SASTD 95 demo and the far term BIS 2015 architecture.

FACTS: The TMG protocols and algorithms would provide automatic
alternate routing and support gateway network management. They will
support network dynamics such as topology changes due to node losses,
connectivity changes. The design will be based on the current DOD MILNET
algorithms and protocols. The protocols and algorithms will be enhanced to
function in the tactical military environment. The protocol/algorithm
design will support the evolution to OSI based gateways for the localized
network environment.
  The near term effort will concentrate on a packet data gateway to
connect localized network data subscribers such as FOTLAN, Wireless LAN,
and ethernets to the MSE wide area net. The results of the near term effort
will be demonstrated in periodic laboratory demonstrations and concluding
in the SASTD 95 DEMO. The far term effort will concentrate on a tactical
multinet gateway to connect the localized network voice/data/video
subscribers with broadband ISDN, metropolitan area networks, MSE wide
area networks.

BRIEFER: Michael Bereschinsky, Proj. Eng. , AMSEL-RD-C3-CC-D, 544-2418

MAJOR THRUSTS

- DEVELOPMENT OF TACTICAL MULTINET GATEWAY FOR LOCALIZED NETWORK DATA SUBSCRIBERS

  - FOTLAN (FDDI BASED)

  - WIRELESS LAN (PACKET MILLIMETER)

  - ETHERNET

  - PACKET SINCGARS

  - TACTICAL METROPOLITAN AREA NETWORK

  - TACTICAL BROADBAND ISDN

TACTICAL MULTINET GATEWAY
USER REQUIREMENTS/DEFICIENCIES

- NO CURRENT AUTOMATED MULTINET GATEWAY CAPABILITY IN THE ATCCS

- AUTOMATED MULTINET GATEWAY SHALL REQUIRE MINIMAL USER INTERVENTION

- AUTOMATED MULTINET GATEWAY SHALL PROVIDE INCREASED LOCALIZED NETWORK SURVIVABILITY

TACTICAL MULTINET GATEWAY
KEY OPERATIONAL CAPABILITIES

- TACTICAL VERSION OF DOD GATEWAY CAPABILITIES WITH IN PLACE EVOLUTION TO THE ISO STANDARDS COMPATIBILITY

- MULTINET GATEWAY PROTOCOLS/ALGORITHMS COMPATIBLE WITH ATCCS CHS

- MULTINET GATEWAY FOR TACTICAL FDDI, ETHERNET, AND WIRELESS LAN

PROGRAM STRATEGY

- NEAR TERM - SASTD ATTD 95 DEMO

  - PACKET DATA GATEWAY TO CONNECT LOCALIZED
    NETWORK DATA SUBSCRIBERS (FOTLAN, WIRELESS
    LAN, ETHERNETS) TO MSE WIDE AREA NET

- FAR TERM - BIS 2015

  - TACTICAL MULTINET GATEWAY TO CONNECT
    LOCALIZED NETWORK VOICE/DATA/VIDEO
    SUBSCRIBERS WITH BROADBAND ISDN,
    METROPOLITAN AREA NETWORKS, MSE WIDE
    AREA NETWORKS

TACTICAL MULTINET GATEWAY
FY92 OBJECTIVES

- COMPLETION OF BASELINE TMG PROTOCOL/ ALGORITHM DESIGN AND EMULATION

- PERFOMANCE CHARACTERIZATION AND TUNING OF TMG PROTOCOL/ALGORITHM EMULATION

TACTICAL MULTINET GATEWAY
FUTURE PLANS (FY93 AND BEYOND)

FY93 • PORTING OF THE TMG PROTOCOLS/ALGORITHMS TO HARDWARE BASE

• PERFORMANCE CHARACTERIZATION OF THE TMG PORTED PROTCOLS/ALGORITHMS

• INTEGRATION OF THE TMG WITH ACTUAL NETS IN THE LAB

FY94 • INTEGRATION AND THE TEST OF THE TMG WITH OTHER SASTD TECHNOLOGIES

• TRANSITION TO SASTD 95 DEMO

FUNDING PROFILE

	RDTE $M	PROC $M	OMA $M
FY92	.360	0	0
FY93	.324	0	0
FY94	TBD	0	0

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CONTRACT OPPORTUNITY

- TACTICAL MULTINET GATEWAY

- OBJECTIVE: - PORT TMG PROTOCOLS/ALGORITHMS
  TO HARDWARE BASE

  - CONDUCT PERFORMANCE CHARAC-
    TERIZATION OF PORTED TMG
    PROTOCOLS/ALGORITHMS

  - INITIATE INTEGRATION OF THE
    TMG WITH ACTUAL NETWORKS IN
    THE LAB

- TYPE: COMPETITIVE, CPFF

CONTRACT OPPORTUNITY
(CONTINUED)

- STATUS: 6.2, EXPLORATORY DEVELOPMENT

- SCHEDULE: AWARD DATE - 2Q FY93
  CONTRACT LENGTH - 10 MONTHS

- APPROXIMATE VALUE: $0.3M

- POC/PHONE#: MICHAEL BERESCHINSKY,
  (908)544-2418/AV 995-2418

FIBER OPTIC TECHNOLOGY

UNCLASSIFIED

BY

LOUIS A. CORYELL

FIBER OPTICS BRANCH
CECOM CENTER FOR C3 SYSTEMS

AMSEL-RL-C3-LA-F

POINT PAPER

SUBJECT: Multiple Quantum Well Modulator

OBJECTIVE: Design, grow, process, test and evaluate a Gallium
Arsenide multiple quantum well device for the high speed external
modulation of laser diodes, thereby verifying theoretical predictions
regarding efficiency and modulation depth.

TYPE: MIPR To Air Force Rome Laboratory

STATUS: 6.1 Research

SCHEDULE: Phase 2 Award Date 3Q FY 91
         Period of Performance - 24 Months

POC/PHONE #: ROBERT SHIELDS/(908)544-3620

USER REQUIREMENTS/DEFICIENCIES:

- Capacity requirements for intercommunication between tactical and
strategic information processing facilities is rapidly expanding.
Envisioned requirements include transmissions links which support
multitudes of voice, video and data channels. Optimizing capacity
requires maximizing physical link bandwidth.

- Future transmission systems are now envisioned which exceed
100Gbps Optical transmission systems are the only alternative at
this bit rate.

- Tomorrows transmitters will be required to operate at 100Gbps
Internal Laser diode modulation is inherently limited to
approximately 18Gbps. Internal modulation is also inefficient in
terms of power consumption.

KEY OPERATIONAL CAPABILITIES:

- GaAs modulators allow for the possibility of monolithic
integration with other existing GaAs architectures.

- External modulation could theoretically far exceed the current
state of the art.

- Multiple Quantum Well devices have demonstrated pronounced
modulation depths and improved efficiency over existing high speed
optical modulators.

- Phase modulation device development provides for a more generic
technology in that it allows for the anticipated low operating budget
within coherent (heterodyne detection) communications systems while
still providing for todays direct detection schemes.

PROGRAM STRATEGY:

- The device wafer and Mach-Zhender mask are currently being fabricated at Photronics Inc. and Bellcore respectively.

- Within the near future device processing will take place at Princeton University, and device testing will take place at both Princeton University and CECOM Laboratorys.

- The future strategy is to transition the program to 6.2 development of Fiber Optic wideband RF Links in FY-94.

FY 92 OBJECTIVES:

- Complete fabrication of the Mach Zhender architecture for the modulator, with subsequent testing and characterization.

- Simultaneous to device fabrication, work with Princeton in developing a proposal for the systems application demonstration.

FUTURE PLANS:

- Work towards a high speed systems application demonstration.

FUNDING PROFILE:

	RDTE	PROC	OMA
FY92	$50K	-	-
FY93	$80K	-	-
FY94	$80K	-	-
TOTAL	$210K	-	-

APPROX. MIPR VALUE: $210K

ADDITIONAL CONSIDERATIONS:

- The multiple quantum well program has been successful for C3 Systems not only in terms of device performance accomplishments, but in establishing an active presence in the photonics including working relationships with Air Forcr Rome Lab., Princeton University, Electronic Test and Devices Labs.,and Bellcore.

MAJOR THRUSTS

- FIBER OPTIC WIDE BANDWIDTH RF LINKS

- ANALOG AND DIGITAL TRANSMISSION

- USE OF INTEGRATED COMPONENT
  AND MULTIPLE QUANTUM WELL
  TECHNOLOGY

  - LASERS/MODULATORS

  - DETECTORS/ELECTRONICS

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FIBER OPTIC WIDEBAND RF LINKS

- USER REQUIREMENTS/DEFICIENCIES

  - NO MILITARY ANALOG FIBER OPTIC TRANSMISSION SYSTEMS CURRENTLY AVAILABLE

  - SPEED OF CURRENTLY AVAILABLE MILITARY DIGITAL FIBER OPTIC TRANSMISSION SYSTEMS LIMITED TO 250 Mb/s

FIBER OPTIC WIDEBAND RF LINKS

- KEY OPERATIONAL CAPABILITIES

- PROVIDES USERS WITH ANALOG AND DIGITAL FIBER OPTIC TRANSMISSION SYSTEMS

- ANALOG/DIGITAL TRANSMISSION CAPABILITY TO GREATER THAN 25 GHz

- BUILDS ON EARLIER PHOTONICS PROGRAMS ON QUANTUM WELL MODULATORS AND D-SHAPED OPTICAL FIBER TRANSCEIVERS

FIBER OPTIC WIDWBAND RF LINKS ADDITIONAL CONSIDERATIONS

- INCREASED CAPABILITIES

- ANALOG CAPABILITY FOR RADIO AND RADAR REMOTING

- OPTICAL SIGNAL PROCESSING CAPABILITY

- JOINT SERVICE PARTICIPATION

- AIR FORCE ROME LAB

FIBER OPTIC WIDEBAND RF LINKS
PROGRAM STRATEGY

- CURRENT STATUS

  - PROGRAM FORMULATION ONGOING
    BASED UPON PHOTONICS AND
    LOCAL AREA NETWORK SUPPORT
    EFFORTS

- FUTURE STRATEGY

  - EXPLORATORY DEVELOPMENT CONTRACT
    SCHEDULED FOR SOLICITATION 2Q93

  - EXPLORATORY DEVELOPMENT CONTRACT
    AWARD SCHEDULED 1Q94

FIBER OPTIC WIDEBAND RF LINKS

- FY 92 OBJECTIVES

  - CONTINUE PROGRAM FORMULATION BASED UPON PRIOR PHOTONICS AND LOCAL AREA NETWORK SUPPORT EFFORTS

- FUTURE PLANS

  - INITIATE PREPARATION OF PROCUREMENT DOCUMENTATION IN FY93

CONTRACT OPPORTUNITY

TITLE: FIBER OPTIC WIDEBAND RF LINKS

OBJECTIVE: DEVELOP WIDE BANDWIDTH ANALOG AND
                  DIGITAL FIBER OPTIC LINKS FOR USE IN
                  POINT-TO-POINT, LOCAL AREA NETWORK
                  AND SIGNAL PROCESSING APPLICATIONS

TYPE: COST PLUS FIXED FEE

STATUS: 6.2 DEVELOPMENT

SCHEDULE: AWARD DATE - 1Q FY94
                  CONTRACT LENGTH - 30 MONTHS

APPROX. VALUE: $ 1.500M

POC/PHONE: ROBERT SHIELDS / (908) 544-3620
                                   DSN 995-3620

INFORMATION SECURITY

(UNCLASSIFIED)

BARRY S. SALIS

CHIEF, INFOSEC DIVISION

CECOM CENTER FOR C3 SYSTEMS

MAJOR THRUSTS

- ISS/SOF MATERIEL ACQUISITION SUPPORT

- NETWORK SECURITY (ARMY SECURE TACTICAL INITIATIVE)

  - TACTICAL END-TO-END ENCRYPTION DEVICE (TEED)

  - SECURE GATEWAY (SEGAT)

  - SECURE AUTHENTICATION (SAUTH)

  - TRUSTED NETWORK BASE (TNB)
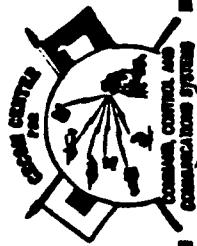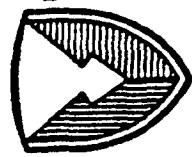
THRUST/AREA/SYSTEM
ISS/SOF SUPPORT

- **USER REQUIREMENTS**

  ENGINEERING AND TECHNICAL DOCUMENTATION AND
  SERVICES TO SUPPORT:

  - • INFOSEC DIVISION'S INFORMATION SYSTEM SECURITY
    MISSION AND FUNCTION IN COMSEC, COMPUSEC,
    TRANSEC, LPI/D, NETWORK SECURITY AND SIGSEC

  - • INFOSEC DIVISION'S SUPPORT TO PEOs, PMs AND OTHER
    R&D CENTERS, AND TO NON-TRADITIONAL CUSTOMER
    PROGRAMS AND THE COMMAND MANAGER FOR SPECIAL
    OPERATIONS FORCES
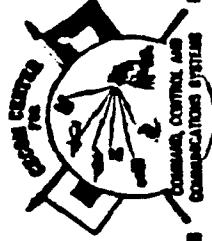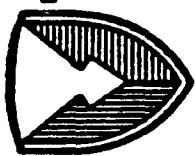
US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey

THRUST AREA/SYSTEM
ISS/SOF SUPPORT

o KEY CAPABILITIES

- PROGRAM DOCUMENTATION SUPPORT

- TECHNICAL DOCUMENTATION SUPPORT

- SYSTEM ENGINEERING SUPPORT

- SYSTEM FUNCTION TEST REPORT

- HARDWARE/SOFTWARE MODIFICATION INTEGRATION/
  INSTALLATION/TESTS SUPPORT

- MAINTENANCE SUPPORT

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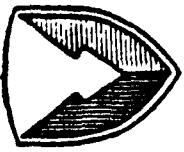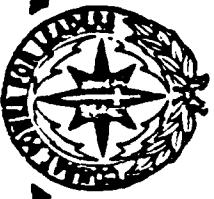
ADDITIONAL CONSIDERATIONS

ISS/SOF SUPPORT REQUIRES:

- LOCAL OFFICE TO QUICKLY RESPOND TO CUSTOMER REQUIREMENTS

- ESTABLISHMENT OF CERTIFIED SCIF IN SUPPORT OF ISS/SOF PROJECTS
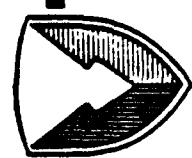
PROGRAM STRATEGY
ISS/SOF SUPPORT

- CURRENT STATUS - CURRENT MATERIAL ACQUISITION SUPPORT CONTRACT IS ONGOING. FOLLOW-ON LEVEL OF SUPPORT WILL BE CONTINUED BY WINNER OF THIS CONTRACT OPPORTUNITY.

- FUTURE STRATEGY - MATERIEL ACQUISITION SUPPORT WILL BE A CONTINUING NEED BY THE INFOSEC DIVISION, SOF OFFICE, AND SUPPORTED PEO/PM OFFICES.
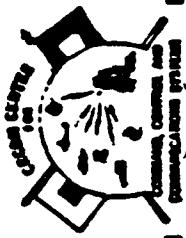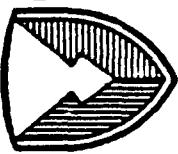
THRUST/AREA/SYSTEM
ISS/SOF SUPPORT

FY 92-93 OBJECTIVES:

ENGINEERING SERVICES AND DOCUMENTATION SUPPORT

- INFOSEC DIVISION'S INFORMATION SYSTEM SECURITY MISSION AND FUNCTION SUPPORT

- ARMY KEY MANAGEMENT SYSTEMS SUPPORT
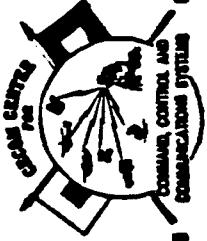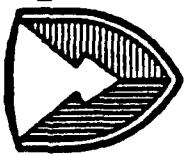
THRUST/AREA/SYSTEM
ISS/SOF SUPPORT

FY 92-93 OBJECTIVES (CON'T):

- COMPUSEC SYSTEMS ACCREDITATION SUPPORT

- SPECIAL OPERATIONS FORCES PROGRAM SUPPORT

- INFOSEC DIVISION'S NON-TRADITIONAL PROGRAMS TECHNICAL SUPPORT
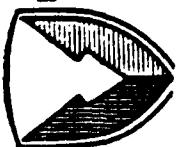
CONTRACT OPPORTUNITY

ISS/SOF MATERIEL ACQUISITION

OBJECTIVE: TIME AND MATERIAL SUPPORT TO C3 SYSTEMS
ISS MISSION AND CUSTOMER EFFORTS, AND SOF
PROGRAM AND TECHNICAL DOCUMENTATION
SYSTEMS TEST, INTEGRATION AND MAINTENANCE
ENGINEERING SUPPORT

TYPE: COMPETITIVE, TIME AND MATERIELS

SCHEDULE: SOLICITATION RELEASE – 1Q FY 92
AWARD – 3Q FY 92
CONTRACT LENGTH – 36 MONTHS

APPROXIMATE VALUE: < $15 M

POC/PHONE – BARRY SALIS / 544-3597

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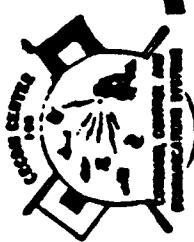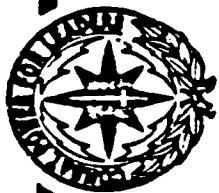
THRUST/AREA/SYSTEM
ARMY SECURE TACTICAL INITIATIVE
(ASTI)

TEED:

- USER REQUIREMENT
  - NO TACTICAL END-TO-END SECURITY SERVICE FOR COMPUTER USERS
  - NO MLS CAPABILITY ON MSE NETWORK

- KEY OPERATIONAL CAPABILITIES
  - PROVIDES USER DATA ENCRYPTION
  - PROVIDES AUTHENTICATION
  - PROVIDES ACCESS CONTROL
  - PROVIDES DATA INTEGRITY

ASTI

SAUTH:

- USER REQUIREMENT

  - FULLY AUTOMATED COMM SYSTEM OF FUTURE ALLOWS ACCESS OF CLASSIFIED DATA WITHOUT HUMAN INTERVENTION

- KEY OPERATIONAL CAPABILITIES

  - PROVIDES ASSURANCE OF IDENTITY OF REMOTE PARTY
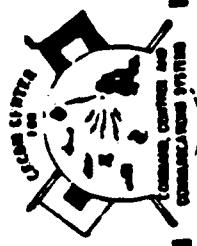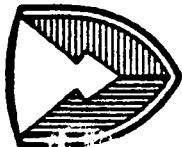
ASTI

TNB:

- **USER REQUIREMENT**

  - PROLIFERATION OF RATED (ORANGE BOOK CRITERIA) AND UNDERRATED COMPUTER TERMINALS IN TACTICAL BATTLEFIELD

  - MULTI-VENDOR PRODUCTION IN FIELD

  - SECURE INTER-NETWORK MANAGEMENT MISSING

  - UNPROTECTED SWITCH
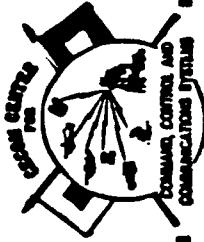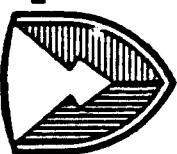
ASTI

TNB (CON'T):

- **KEY OPERATIONAL CAPABILITIES**

  - •• PROVIDE MULTI-LEVEL SECURITY SERVICES TO USER WORKSTATIONS

  - •• PROVIDE RESISTANCE TO "DENIAL OF SERVICE" ATTACKS

  - •• PROVIDE SECURE INTER-NETWORK MANAGEMENT

ADDITIONAL CONSIDERATIONS

ASTI PROGRAM ADDRESSES:

- END-TO-END MULTI-LEVEL SECURITY SERVICES

- SECURE NETWORK BASED AUTHENTICATION

- SECURE CONTINUITY TO ALLIES AND STRATEGIC ASSETS

- COMSEC MANAGEMENT, SWITCH AND TERMINAL HARDENING

US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey
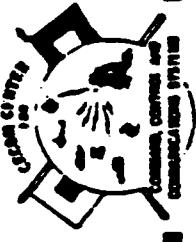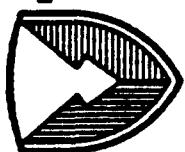
PROGRAM STRATEGY
ASTI

CURRENT STATUS

- REQUIREMENTS DOCUMENTATION BEING STAFFED WITHIN TRADOC

- MARKET INVESTIGATION OF INDUSTRY PRODUCTS COMPLETED

- EXPLORATORY DEVELOPMENT SOLICITATION FOR TEED BEING PROCESSED BY GOVERNMENT

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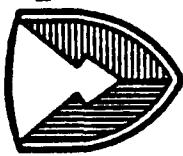
PROGRAM STRATEGY
ASTI

FUTURE STATUS

- DEVELOP AND TEST INITIAL TEED PROTOTYPES (INCLUDE IN SAS ATTD)

- INITIATE DEVELOPMENT PRODUCTION PROVE-OUT (OPPO) PHASE FOR TEED, SAUTH, TNB, AND SEGAT LEADING TO SYSTEM TESTING AND PRODUCTION DECISION

- PROCUREMENT STRATEGY FOR DPPO NOT LOCKED-IN PER DECISION OF INDIVIDUAL COMPONENT CONTRACTS OR OVERALL SYSTEM DEVELOPMENT CONTRACT

CONTRACTING OPPORTUNITY

ASTI-TEED:

OBJECTIVE: 6.2 EFFORT

TYPE: LIMITED COMPETITION (BIDDING LIST FORMULATED IN CONSULTATION WITH NATIONAL SECURITY AGENCY), CPFF

SCHEDULE: AWARD DATE 3Q FY 92
LENGTH 18 MONTHS

APPROXIMATE VALUE: $2 M

POC/PHONE: BARRY SALIS / 544-3597

CONTRACTING OPPORTUNITY

ASTI-TEED:

OBJECTIVE: 6.4 EFFORT

TYPE: LIMITED COMPETITION (BIDDING LIST
FORMULATED IN CONSULTATION WITH
NATIONAL SECURITY AGENCY), CPFF

SCHEDULE: AWARD DATE 2Q FY 94
LENGTH 30 MONTHS

APPROXIMATE VALUE: $11 M

POC/PHONE: BARRY SALIS / 544-3597

CONTRACTING OPPORTUNITY

US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey

ASTI-SAUTH:

OBJECTIVE: 6.2 EFFORT

TYPE: LIMITED COMPETITION (NSA ENDORSED), CPFF

SCHEDULE: AWARD DATE 2Q FY 94
LENGTH 18 MONTHS

APPROXIMATE VALUE: $2 M

POC/PHONE: BARRY SALIS / 544-3597

CONTRACTING OPPORTUNITY

US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey

**ASTI-SAUTH:**

OBJECTIVE: 6.4 EFFORT

TYPE: LIMITED COMPETITION (NSA ENDORSED), CPFF

SCHEDULE: AWARD DATE 2Q FY 95
LENGTH 30 MONTHS

APPROXIMATE VALUE: $6 M

POC/PHONE: BARRY SALIS / 544-3597

CONTRACTING OPPORTUNITY

US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey

ASTI-TNB:

OBJECTIVE: 6.2 EFFORT

TYPE: LIMITED COMPETITION (NSA ENDORSED), CPFF

SCHEDULE: AWARD DATE 2Q FY 94
           LENGTH 18 MONTHS

APPROXIMATE VALUE: $2 M

POC/PHONE: BARRY SALIS / 544-3597
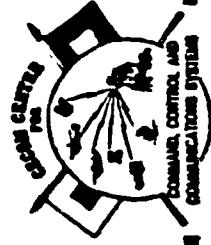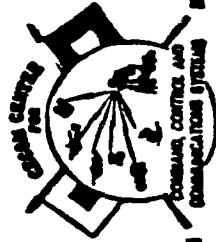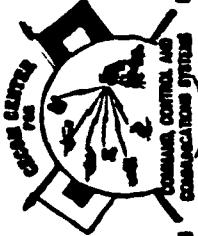
US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey
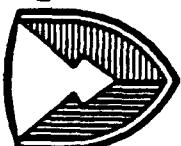
# CONTRACTING OPPORTUNITY

ASTI-TNB:

OBJECTIVE: 6.4 EFFORT

TYPE: LIMITED COMPETITION (NSA ENDORSED), CPFF

SCHEDULE: **AWARD DATE 2Q FY 95**
LENGTH 30 MONTHS

APPROXIMATE VALUE: **$6.5 M**

POC/PHONE: BARRY SALIS / 544-3597
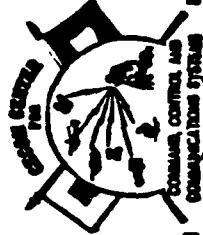
SUMMARY OF CONTRACTOR OPPORTUNITIES

US ARMY COMMUNICATIONS ELECTRONICS COMMAND
Fort Monmouth, New Jersey

YEAR	TITLE	AMOUNT
FY92-FY95	MATERIAL ACQUISITION DOCUMENTATION T&M CONTRACT	$14.5M
FY92-FY93	ASTI-TEED (6.2 PHASE)	$2M
FY94-FY00	ASTI-TEED (6.2/6.4 PHASE) SAUTH TNB	$28M

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MODELING AND SIMULATION

(UNCLASSIFIED)

JOHN SILIATO
ELECTRONICS ENGINEER

CECOM CENTER FOR C3 SYSTEMS

AMSEL-RD-C3-EM-M

Point Paper

SUBJECT: Simulation Architectures

OBJECTIVE: Develop a hardware/software architecture capable of simulation thousands of concurrent objects.

TYPE: Competitive

STATUS: 6.2 Development

SCHEDULE: Award Date 20 Dec 92
          Period of Performance 24 months

POC/PHONE: Robert Ross/(908)544-2575

USER REQUIREMENTS/DEFICIENCIES:

Simulation of military communications systems can encompass 5000 concurrent objects. Fitting simulations of this magnitude in current architectures forces modeling assumptions that compromise the validity of the observed data. Partitioning a large model into 'independent" units run separately is justified only by computation expediency - the real world system may not be separable in the context of the model's assumption. Aggregation of object clusters is another expedient that abridges analysis requirements as well as obscuring comparison of simulation results with real world military exercise data.

KEY OPERATIONAL CAPABILITIES:

   - Economically feasible combinations of computer hardware and software that can accommodate large system simulations are needed. The desired ratio of simulation to real world time is less than five.

   - Hardware candidates are restricted to what is current generation machines. The goal is not speed up of hardware, but acceleration of simulation execution.

PROGRAM STRATEGY:

   - Time event management of concurrent objects is a critical design issue. What will work best?

   - Where is parallellism in discrete event simulation and to what extent can distributed processors take advantage of it?

FY-93 OBJECTIVES:

- Answer the questions raised in program strategy.

FUTURE PLANS:

- Develop a candidate architecture based on design issues identified in FY-93.

FUNDING PROFILE:

	RDTE
	RDTE
FY-93	$50K
FY-94	$50K
TOTAL	$100K

APPROX. CONTRACT VALUE: $100K

Point Paper

SUBJECT: Modeling Methodology

OBJECTIVE: Develop a modeling methodology and environment embedding support tools and databases for validation trails from analysis objectives to simulation code.

TYPE: Competitive

STATUS: 6.2 Development

SCHEDULE: Award Date 30 Oct 92
          Period of Performance 24 months

POC/PHONE: Robert Ross/(908)544-2575

USER REQUIREMENTS/DEFICIENCIES:

- Modeling large systems such as tactical communications deployed on a battlefield is an ad hoc process at present. Although simulation code is the end product, it does not clearly express the model methods, concepts, and assumptions abstracted from analysis goals and system referents.

- Structural validation of a system model is only feasible when direct correspondences can be made from real system objects to abstracted models that are subsequently mapped to simulation implementations .

KEY OPERATIONAL CAPABILITIES:

- Future modeling requires a development environment that integrates and links explicit analysis requirements, model descriptions, and implementations. A real system object must be linked to referent material(specifications), its expression as an abstract description for a specified analysis goal, and its implementation in simulation code.

 - The environment requires software tools to build, record, and display the links and contents in the cumulative modeling and simulation process that stems from analysis requirements.

 - The environment will be implemented on the current generation of workstations. Potential hosts are restricted to those that are presently available commercially.

PROGRAM STRATEGY:

- Define a model description basis that has a visible
correspondence to both referent and implementing software concepts.
The description basis must serve as a bridge of mutual
understanding between referent system experts and simulation
software engineers.

- Identify and specify the interfaces between analysis, modeling,
and implementation phases.

FY-93 OBJECTIVES:

- Complete specification of model description basis.

FUTURE PLANS:

- Complete interface specifications.

- Survey available tools. Adopt applicable candidates and develop
or modify new tools as needed.

FUNDING PROFILE:

	RDTE
FY-93	$75K
FY-94	$75K
TOTAL	$150K

APPROX. CONTRACT VALUE: $150K

MAJOR THRUSTS

- SIMULATION ARCHITECTURES
- HIGH DENSITY MODELS
- MODELING ENVIRONMENTS
- STRUCTURAL VALIDATION
- FORMAL SPECIFICATIONS
- TRACEABILITY FROM ANALYSIS TO CODE

MODELING METHODOLOGY

- CONSISTENT METHODOLOGY FROM ANALYSIS GOALS AND REFERENT SYSTEM TO SIMULATION IMPLEMENTATION

- END-TO-END STRUCTURAL VALIDATION TRAIL

- FILTERS(EXPERT SYSTEMS?) TO ABSTRACT NECESSARY FACTS, RELATIONS RELEVANT TO MODEL SCOPE

- NATURAL LANGUAGE DESCRIPTIONS FOR UNDERSTANDING

- FORMAL DESCRIPTIONS FOR SOFTWARE IMPLEMENTATION

SIMULATION ARCHITECTURES

•HOW TO SIMULATE THOUSANDS OF CONCURRENT OBJECTS?

•EXECUTION TIME << 5*(REAL TIME)

•FEASIBLE HOST COMPUTER ARCHITECTURES

•TIME EVENT MANAGEMENT

KEY OPERATIONAL CAPABILITIES

- PROVIDE ANALYSIS OF FIELD PROBLEMS

- EVALUATE ECP'S

- PROVIDE PM SUPPORT

PROGRAM STRATEGY

- CURRENT STATUS
  - LABORATORY SIMULATION ON LINE

- FUTURE STRATEGY
  - UPGRADE CURRENT METHODS
  - DEVELOP SIMULATION MODELS

CONTRACT OPPORTUNITY

TITLE: SIMULATION ARCHITECTURE

OBJECTIVE: DEVELOP A HARDWARE/SOFTWARE ARCHITECTURE CAPABLE OF SIMULATING 5000 CONCURRENT OBJECTS

TYPE: COMPETITIVE, CPFF

STATUS: 6.2 DEVELOPMENT

SCHEDULE: AWARD DATE 20 DEC 92
PERIOD OF PERFORMANCE - 24 MONTHS

APPROX. VALUE: $100K

POC/PHONE: ROBERT ROSS (908)544-2575

CONTRACT OPPORTUNITY

TITLE: MODELING METHODOLOGY

OBJECTIVE: DEVELOP A CONSISTENT METHODOLOGY FOR BUILDING SIMULATION MODELS WITH A VALIDATION TRAIL BACK TO ANALYSIS REQUIREMENTS AND SYSTEMS REFERENTS

TYPE: COMPETITIVE, CPFF

STATUS: 6.2 DEVELOPMENT

SCHEDULE: AWARD DATE 30 OCT 92
PERIOD OF PERF. - 24 MONTHS

APPROX. VALUE: $150K

POC/PHONE: ROBERT ROSS/(908)544-2575

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